

# Growth Diagnostics\*

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Revised October 2004

## 1. Introduction

Most well-trained economists would agree that the standard policy reforms included in the Washington Consensus have the potential to be growth-promoting. What the experience of the last 15 years has shown, however, is that the impact of these reforms is heavily dependent on circumstances. Policies that work wonders in some places may have weak, unintended, or negative effects in others.<sup>1</sup> We argue in this paper that this calls for an approach to reform that is much more contingent on the economic environment, but one that also avoids an “anything goes” attitude of nihilism. We show it is possible to develop a unified framework for analyzing and formulating growth strategies that is both operational and based on solid economic reasoning. The key step is to develop a better understanding of how the binding constraints on economic activity differ from setting to setting. This understanding can then be used to derive policy priorities accordingly, in a way that uses efficiently the scarce political capital of reformers.

Our approach is motivated by three considerations. First, while development is a broad concept entailing the raising of human capabilities in general, we believe increasing economic growth rates is the central challenge that developing nations face. Higher levels of living standards are the most direct route to achieving improvements in social and human indicators. Reform strategies should be principally targeted at raising rates of growth—that is, they should be growth strategies.

Second, trying to come up with an identical growth strategy for all countries, regardless of their circumstances, is unlikely to prove productive. Growth strategies are likely to differ according to domestic opportunities and constraints. There are of course some general, abstract principles—such as property rights, the rule of law, market-oriented incentives, sound money, and sustainable public finances—which are desirable everywhere. But turning these general principles into operational policies requires considerable knowledge of local specificities.

Third, it is seldom helpful to provide governments with a long list of reforms, many of which may not be targeted at the most binding constraints on economic growth. Governments face

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\*We owe thanks to Eduardo Engel, Robert Lawrence, Lant Pritchett, Andrés Rodríguez-Clare and Arvind Subramanian, our collaborators on a number of related projects, as well as other participants in the Kennedy School Lunch Group on International Economic Policy (LIEP) for many discussions over the years that led to the development of the ideas reported here.

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<sup>1</sup>This is well reflected in the view expressed recently by Al Harberger (2003, p. 15): “when you get right down to business, there aren’t too many policies that we can say with certainty deeply and positively affect growth.”

administrative and political limitations, and their policy-making capital is better deployed in alleviating binding constraints than in going after too many targets all at once. So growth strategies require a sense of priorities.

What we propose to do in this paper is to develop a framework for *growth diagnostics*—that is, a strategy for figuring out the policy priorities. The strategy is aimed at identifying the most binding constraints on economic activity, and hence the set of policies that, once targeted on these constraints at any point in time, is likely to provide the biggest bang for the reform buck.

The methodology that we propose for this can be conceptualized as a decision tree (see Figure 1, discussed in section 4). We start by asking what keeps growth low. Is it inadequate returns to investment, inadequate private appropriability of the returns, or inadequate access to finance? If it is a case of low returns, is that due to insufficient investment in complementary factors of production (such as human capital or infrastructure)? Or is it due to poor access to imported technologies? If it is a case of poor appropriability, is it due to high taxation, poor property rights and contract enforcement, labor-capital conflicts, or learning and coordination externalities? If it is a case of poor finance, are the problems with domestic financial markets or external ones? And so on.

Then we discuss the kind of evidence that would help answer these question one way or another. We also illustrate the practical implications of this approach by drawing on examples from specific countries.

Aside from providing a useful manual for policymakers, our approach has the advantage that it is broad enough to embed all existing development strategies as special cases. It can therefore unify the literature and help settle prevailing controversies. For example, our framework will clarify that doctrinal differences on development policy—between proponents of the Washington Consensus and more state-led strategies, or between pro-globalizers and cautious globalizers—are grounded in divergent evaluations about the nature of the binding constraints on growth. Making these differences explicit, and clarifying the nature of the evidence that can resolve them, can move us forward to a more productive policy agenda.

The outline of the paper is as follows. We first lay out the conceptual framework, linking our terminology of “binding constraints” to standard economic models. In particular, we relate our framework to theories of second-best and partial reform and of endogenous growth. We next cast the framework in the form of a decision tree, and discuss the nature of the evidence that is required to move along the nodes of the tree. In the final section we carry out an empirical analysis for a number of “archetypal” cases, each representing a different syndrome, or combination of binding constraints.

## 2. Thinking about reform and growth: a framework

We begin by laying out a formal treatment of our approach. This should help clarify how our discussion of “binding constraints” and “growth diagnostics” relates to conventional economic theory. We show that our approach is grounded on the standard theories of second-best and partial reform. These conceptual foundations provide structure to our framework, even though we naturally have to take a number of short-cuts when we operationalize it. We begin with a general treatment, and then provide a more stylized model that allows us to discuss a number of illustrations.

## 2.1. The general case

Let  $\mathbf{c} = \{c_0, c_1, \dots, c_T\}$  denote the vector of aggregate consumption over the relevant planning horizon  $[0, T]$ . The policy maker desires to maximize the social welfare function  $u(\mathbf{c})$  subject to a number of constraints. One such constraint is technology, which tells us how we can convert the economy's resource endowments  $\mathbf{k}$  into output  $\mathbf{y}$ . Here  $\mathbf{k}$  is the vector of productive factors over time, which includes reproducible factors such as physical and human capital. Let  $\mathbf{y} = \{y_0, y_1, \dots, y_T\}$  be the output vector, defined in a manner analogous to consumption. The technological constraint can be expressed in its most general form as  $\Gamma(\mathbf{k}, \mathbf{y}) \leq 0$ . Note that this formulation does not require technology to be constant, and allows endogenous technological change over time (say by deploying resources appropriately). Indeed, since the main difference between rich and poor countries is the productivity with which resources are utilized, we will have to focus on how aggregate productivity is determined and how it changes over time. In addition, the economy faces an intertemporal budget constraint that depicts the extent to which, if at all, output and consumption can be spread across time. We write this budget constraint as  $B(\mathbf{c}, \mathbf{y}) \leq 0$ . In the absence of market imperfections and economic distortions, the standard planning problem can then be expressed as follows.

$$\begin{aligned} \text{Max } u(\mathbf{c}) \quad & \text{s.t.} \\ B(\mathbf{c}, \mathbf{y}) & \leq 0. \end{aligned} \tag{2.1}$$

$$\Gamma(\mathbf{k}, \mathbf{y}) \leq 0 \tag{2.2}$$

The solution to this problem yields the standard equalities between social marginal utilities of consumption and social marginal resource costs at every point in time.

However an economy that is under-performing and in need of reform is by definition one where market imperfections and distortions are rampant. These distortions can be government-imposed (e.g., taxes on production) or inherent to the functioning of certain markets (e.g., human capital externalities, information spillovers, and so on). They prevent the best use of the economy's resources and, in particular, keep the economy far below its attainable productivity frontier. At this level of generality, we need not take a position on the nature of these distortions, although we will later do so. In the empirical application below, we shall worry especially about problems entailed in what we call "self-discovery": the informational spillovers that reduce entrepreneurship in pursuit of new economic activities. At this point it suffices to note that, regardless of how they arise, such distortions drive a wedge between private and social valuations of specific economic activities.

Let us denote these wedges by  $\boldsymbol{\tau} = \{\tau_1, \tau_2, \dots, \tau_k\}$  with  $\tau_i$  representing the distortion in activity  $i$ . The distortions can then be modeled as additional constraints that take the general form

$$\mu_i^s(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau}) - \mu_i^p(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau}) - \tau_i = 0, \tag{2.3}$$

where  $\mu_i^s(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau})$  and  $\mu_i^p(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau})$  represent net marginal valuations of activity  $i$  by society and by private agents, respectively. Equations of this type are nothing other than restatements of the first-order conditions for the private sector. For example, a tax on investment (or a learning externality) keeps the private return on capital accumulation below the social return, with the result that the economy under-invests. Note that the private and social valuation

functions for each activity will depend in general equilibrium on all the wedges in the system. What this means is that the distortion in any one activity also affects the first order condition for other activities. That is the essence of the second-best problems that we will explore below.

The social planner has to maximize social welfare subject to the additional constraints capturing the distortions in the economy. The Lagrangian associated with this optimization problem is as follows:

$$L = u(\mathbf{c}) + \lambda_T \Gamma(\mathbf{k}, \mathbf{y}) + \lambda_B B(\mathbf{c}, \mathbf{y}) + \sum_i \lambda_i [\mu_i^s(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau}) - \mu_i^p(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau}) - \tau_i] \quad (2.4)$$

where  $\lambda_T \geq 0$ ,  $\lambda_B \geq 0$ , and  $\lambda_i \geq 0$ ,  $i = \{1, 2, \dots, k\}$  are the Lagrange multipliers associated with each of the constraints. We are now ready to derive an expression for the social welfare impact of reducing any given distortion,  $\tau_j$ . From the envelope theorem, this is given by the partial derivative of  $L$  with respect to  $\tau_j$ .

$$\frac{du}{d\tau_j} = \frac{\partial L}{\partial \tau_j} = -\lambda_j + \sum_i \lambda_i \frac{\partial [\mu_i^s(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau}) - \mu_i^p(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau})]}{\partial \tau_j} \quad (2.5)$$

The interpretation of this expression is as follows. Assume, without loss of generality, that the initial value of  $\tau_j$  is strictly positive. The wedge created by the distortion in market  $j$  can be thought of as a tax that reduces the equilibrium level of activity in that market by keeping the net private return below the social return. The first term on the right-hand side of (2.5) captures the direct effect of a small change in  $\tau_j$ : a small reduction in  $\tau_j$  increases aggregate welfare by an amount given by the multiplier associated with the  $j$ th constraint,  $\lambda_j$ . In other words,  $\lambda_j$  is the marginal welfare benefit from reducing the distortion in market  $j$ , disregarding the effect on other distorted activities. The more costly is the distortion, the higher the magnitude of  $\lambda_j$ . At the other end of the spectrum, when activity  $j$  is undistorted ( $\tau_j = 0$ ), the constraint ceases to bind, since the planner's first-order conditions coincide with those of private agents, and  $\lambda_j = 0$ .

Turn now to the second term on the right-hand side of equation (2.5). When activity  $j$  is the sole distorted activity, this term vanishes since  $\lambda_i = 0$  for all  $i \neq j$ . In this case, only the direct effect matters. But when there are other distorted activities in the economy, which is the typical case in a reforming economy, we need to track the interaction effects across distorted margins, which is what the term with the summation does. This second term captures the effect of changing  $\tau_j$  on the weighted sum of the gaps between social and private valuations, with the weights corresponding to each distorted activity's own Lagrange multiplier. If on balance the effect is to reduce these gaps, everything else constant, then the reduction in  $\tau_j$  produces an additional welfare benefit. If, on the other hand, these interactions tend to increase the gap between private and social valuations at the margin, the welfare gain is reduced.<sup>2</sup> Conceivably, the reduction in  $\tau_j$  could even produce a welfare loss. This is a typical second-best complication.

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<sup>2</sup>Note that in equilibrium, the gaps between social and private valuations for the non- $i$  activities have to revert back to their original values, since the wedges for these activities have not changed. What restores the equilibrium is the (privately optimal) adjustments in the consumption, production, or accumulation levels—i.e., changes in  $\mathbf{c}$ ,  $\mathbf{y}$ ,  $\mathbf{v}$ —that enter the valuation functions. So, for example, an increase in the private valuation of producing a good would normally result in an increase in the quantity supplied, with a corresponding decline in the marginal valuation.

Consider an illustration with two activities:  $j$  = intermediate input production; and  $\ell$  = final good production. Suppose both activities are protected by import tariffs, given by  $\tau_j$  and  $\tau_\ell$  respectively. Let us consider the partial effect of reducing  $\tau_j$  while keeping  $\tau_\ell$  constant. A reduction in  $\tau_j$  produces a direct welfare gain that would be captured by its own multiplier. But it also produces an indirect effect downstream in the production of the final good. Since the final good is protected, private valuations of producing the good exceed social valuations. A reduction in the intermediate-good tariff,  $\tau_j$ , aggravates this distortion by increasing private profitability further. The increased gap between private and social valuations reduces the welfare gain from the reduction in  $\tau_j$ . Indeed, if  $\lambda_\ell$  is sufficiently high relative to  $\lambda_j$ , implying that the distortion in the final-good activity is particularly severe, the tariff reform could even result in a welfare loss.

As a second, macroeconomic illustration consider the case of a single-good economy with two periods (today and tomorrow). Let  $j$  = goods today; and  $\ell$  = goods tomorrow. Suppose the government maintains a restriction on international borrowing, which means that the social marginal valuation of expenditure today exceeds its private marginal valuation:  $\lambda_j > 0$ . Relaxation of the borrowing restriction would normally enhance domestic welfare. But suppose that for moral hazard reasons households and firms discount tomorrow's expenditure at a heavier rate than is socially optimal ( $\mu_i^s(\cdot) - \mu_i^p(\cdot) > 0$ , with corresponding  $\lambda_\ell > 0$ ). In this case, relaxing today's borrowing restriction would aggravate the latter distortion. As before, if  $\lambda_\ell$  is sufficiently high relative to  $\lambda_j$ , removing the borrowing restriction could make the economy worse off.

Finally, with only a slight complication of the framework, let us consider the implications of political or administrative constraints. Suppose it takes political "effort" to undertake reform in any given market (i.e. to reduce any  $\tau_j$ ). Politicians/bureaucrats have limited political/bureaucratic capital, so that eliminating one distortion makes it less likely that any other distortion will be removed as well. We represent this through a "political budget constraint" of the form  $\Pi(\boldsymbol{\tau}; \mathbf{c}, \mathbf{k}, \mathbf{y}) \leq 0$ , with  $\frac{\partial \Pi(\boldsymbol{\tau}; \mathbf{c}, \mathbf{k}, \mathbf{y})}{\partial \tau_j} > 0$  for all  $j$ . Let the associated Lagrange multiplier be  $\lambda_\Pi$ . The Lagrangian is now expressed as

$$\begin{aligned} L = & u(\mathbf{c}) + \lambda_T \Gamma(\mathbf{k}, \mathbf{y}) + \lambda_B B(\mathbf{c}, \mathbf{y}) \\ & + \sum_i \lambda_i [\mu_i^s(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau}) - \mu_i^p(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau}) - \tau_i] + \lambda_\Pi \Pi(\boldsymbol{\tau}; \mathbf{c}, \mathbf{k}, \mathbf{y}) \end{aligned} \quad (2.6)$$

with the corresponding partial welfare evaluation:

$$\frac{du}{d\tau_j} = \frac{\partial L}{\partial \tau_j} = -\lambda_j + \sum_i \lambda_i \frac{\partial [\mu_i^s(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau}) - \mu_i^p(\mathbf{c}, \mathbf{y}, \mathbf{k}, \boldsymbol{\tau})]}{\partial \tau_j} + \lambda_\Pi \frac{\partial \Pi(\boldsymbol{\tau}; \mathbf{c}, \mathbf{k}, \mathbf{y})}{\partial \tau_j} \quad (2.7)$$

The key point is that the presence of a political budget constraint introduces trade-offs among different types of reforms even when the second-best interactions of the type we considered in the two examples above are insignificant. To see this, consider the limit case where there are no second-best interactions at all, i.e.  $\frac{\partial [\mu_i^s(\cdot) - \mu_i^p(\cdot)]}{\partial \tau_j} = 0$  for all  $i$ . Equation (7) now simplifies to

$$\frac{du}{d\tau_j} = \frac{\partial L}{\partial \tau_j} = -\lambda_j + \lambda_\Pi \frac{\partial \Pi(\boldsymbol{\tau}; \mathbf{c}, \mathbf{k}, \mathbf{y})}{\partial \tau_j} \quad (2.8)$$

This expression is of ambiguous sign. In this case, we still have to contend with the possibility that reducing distortion  $\tau_j$  results in too high a “political” cost (i.e., foregone benefits from reforms in other areas) relative to its direct economic benefits.

With this broad framework as a background, consider now several archetypal reform strategies.

### **2.1.1. Wholesale reform**

One way to eliminate all ambiguities and uncertainties with regard to the consequences of reform strategies is to simultaneously eliminate all distortions. If all the wedges are tackled and eliminated simultaneously, the multipliers associated with each of them go to zero, and none of the second-best issues we have highlighted above remains relevant. Wholesale reform is guaranteed to improve welfare. The best possible economic growth rate is achieved by eliminating all obstacles that stand in its way.

But notice what this strategy requires. It requires us not only to have complete knowledge of all prevailing distortions, it also necessitates that we have the capacity to remove them all in their entirety. This is the technically correct, but practically impossible strategy.

### **2.1.2. Do as much reform as you can, as best as you can**

The second strategy, which seems to us to characterize the prevailing approach today, is to ignore the basic economics of the framework outlined above and to simply go for whatever reforms seem to be feasible, practical, politically doable, or enforceable through conditionality. This is a laundry-list approach to reform that implicitly relies on the notions that (i) any reform is good; (ii) the more areas reformed, the better; and (iii) the deeper the reform in any area, the better.

Our framework shows why this approach, even if practical, is faulty in its economic logic. First, the principle of the second-best indicates that we cannot be assured that any given reform taken on its own can be guaranteed to be welfare promoting, in the presence of multitudes of economic distortions. Second, welfare need not be increasing in the number of areas that are reformed—except in the limiting case of wholesale reform, as discussed above. Third, in the presence of second-best interactions, more extensive reform in any given area is as likely to fall prey to adverse interactions as an incremental approach.

### **2.1.3. Second-best reform**

A more sophisticated version of the previous strategy is one that explicitly takes into account the second-best interactions discussed above. Thus, one could envisage a reform strategy that is less ambitious than the wholesale approach, but that recognizes the presence of the second term in equation (5), namely the possibility that interactions across distorted markets have the potential to both augment and counter the direct welfare effects. Under this strategy, one would give priority to reforms that engender positive second-best effects, and downplay or avoid altogether those that cause adverse effects. As the examples given above show, partial trade reform or capital-account liberalization may reduce welfare unless more extensive reforms in trade and in financial markets are done at the same time.

The difficulty with a second best reform strategy is that many, if not, most of these second-best interactions are very difficult to figure out and quantify *ex ante*. The strategy requires having a very good sense of the behavioral consequences of policy changes across different markets and activities. The state of the art (based largely on static computable general equilibrium models) is not very encouraging in this respect. In practice, most of the second-best interactions remain obscure, and tend to be revealed after the fact rather than *ex ante*.

#### 2.1.4. Target the biggest distortions

If second-best interactions cannot be fully figured out and it is impractical to remove all distortions at once, reformers may instead focus on eliminating or reducing the biggest distortions in the economy—i.e., the largest wedges ( $\tau_j$ ) between private and social valuations. This would be an application of what is known as the concertina method in the literature on trade theory: order distortions from largest to smallest in proportional terms, start by reducing the largest of these to the level of the next largest, and proceed similarly in the next round. Under certain (fairly restrictive) conditions,<sup>3</sup> this strategy can be shown to be welfare improving.

However, even leaving aside its limited theoretical applicability, this approach has two severe shortcomings. First, it does require us to have a complete list of distortions, even those that do not take the form of explicit taxes or government interventions. Distortions that arise from market failures or imperfect credibility, for example, are unlikely to show up on our radar screen unless we have reason to look for them. Second, the concertina method does not guarantee that the reforms with the biggest impacts on economic welfare and growth will be the ones undertaken first. It may well turn out that the highest "tax" is on some activity with very limited impact on growth. For example, there may be very high taxes on international borrowing, yet their removal could have miniscule effect on growth if the economy is constrained not by savings but by investment demand. For these reasons, this strategy is of uncertain benefits, especially in the short run.

#### 2.1.5. Focus on the most binding constraints

The approach we advocate in this paper is to design reform priorities according to the magnitude of the direct effects—i.e., the size of the  $\lambda_j$ . This is the strategy that we think is the most practical, as well as the most promising with regard to the likely bang from reform. The idea behind the strategy is simple: if (a) for whatever reason the full list of requisite reforms is unknowable or impractical, and (b) figuring out the second-best interactions across markets is a near-impossible task, the best approach is to focus on the reforms where the direct effects can be reasonably guessed to be large. As equation (5) indicates, as long as reform focuses on the relaxation of the distortions with the largest  $\lambda$ 's associated with them, we have less to worry that second-best interactions will greatly diminish or possibly reverse the welfare effects. The principle to follow is simple: go for the reforms that alleviate the most binding constraints, and hence produce the biggest bang for the reform buck. Rather than utilize a spray-gun approach, in the hope that we will somehow hit the target, focus on the bottlenecks directly.

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<sup>3</sup>The (sufficient) condition is that the activity whose tax is being reduced be a net substitute (in general equilibrium) to all the other goods. See Hatta (1997).

Whether these binding constraints can be effectively identified is a practical and empirical matter, and we will spend considerable time below arguing that this can be done in a reasonable manner. In practice, the approach we take starts by focusing not on specific distortions (the full list of which is unknowable, as we argued above), but on the proximate determinants of economic growth (saving, investment, education, productivity, infrastructure, and so on). Using a simple growth model as our guide, we first identify those determinants with the largest direct impacts on economic growth. Once we know where to focus, we then look for associated economic distortions whose removal would make the largest contribution to alleviating the constraints on growth.

In what follows we first place the argument we have just made in the context of a more fully articulated growth model, and discuss some of the second-best issues that arise in greater detail.

### 3. A simple growth model

Consider the simplest possible endogenous growth model and add a number of distortions. Suppose there is a representative household with partial access to the world capital market. It can borrow abroad, but subject to a collateral constraint. This is the first distortion, or wedge.

The household can accumulate capital, used to produce productive inputs that are sold to the firm. There is an externality in the production of productive inputs from capital. This is the second distortion. There is a public subsidy to the hiring of productive inputs, which may partially offset the effects of the externality.

Government provides services to firms, for which it charges a price. This price need not reflect production costs fully. This is the third potential wedge. To fund public services and other activities, the government imposes a tax on firm income. This is the fourth wedge.

Finally, government bureaucrats waste resources in ways that give citizens no utility. This is the fifth and last wedge.

#### 3.1. Households

The representative household faces the budget constraint

$$\dot{k}_t + \dot{b}_t = r_t x_t + \rho b_t + \pi_t - c_t (1 + \delta), \quad (3.1)$$

where  $k_t$  is capital (with return  $r_t$ ),  $x_t$  are productive inputs and  $r_t$  their price,  $b_t$  is holdings of an internationally traded bond<sup>4</sup> (which carries the constant world interest rate  $\rho$ ),  $\pi_t$  are firm profits (transferred to the household in the form of dividends),  $c_t$  is household consumption (with constant tax rate  $\delta$ ), and the single consumption good is the numeraire.

Inputs  $x_t$  are made using capital according to the technology

$$x_t = k_t^{1-\theta} \bar{k}_t^\theta, \quad (3.2)$$

where  $\bar{h}$  is average (economy-wide) capital and  $0 \leq \theta \leq 1$  indicates an external effect. We want to think of capital as a broad aggregate that may include not just physical capital, but also human, managerial and organizational capital. Similarly, productive inputs should be interpreted

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<sup>4</sup>Note such holdings can be positive or negative.



broadly to include knowledge of all kinds and not just the physical components of production. With this interpretation in mind, we can think of several types of external effects in the transformation of capital into inputs, such as information spillovers or technological spillovers, and assorted institutional barriers to their resolution: difficulty with patenting technological adaptations, coordination failures, and so on.

The household can be constrained in the world bond market. If its holdings are negative (that is, if it is a debtor internationally), the household has to abide by

$$-b_t \leq \beta k_t, \quad (3.3)$$

which may or may not bind, and where  $0 \leq \beta < 1$  is necessary to ensure a well-defined equilibrium. It must also satisfy the standard no-Ponzi game condition

$$\lim_{t \rightarrow \infty} (b_t e^{-\rho t}) \geq 0, \quad (3.4)$$

The objective function of the representative household is

$$W = \int_0^\infty \log c_t e^{-\rho t} dt, \quad (3.5)$$

to be maximized s.t. to  $k_0 > 0$ ,  $d_0 = 0$ , (3.1), (3.2), (3.3) and (3.4).<sup>5</sup>

The appendix shows that the solution of this problem involves two cases. If  $r_t(1 - \theta) > \rho$  the economy is finance-constrained: because the return on capital at home is relatively high, the household borrows all it can abroad to acquire domestic capital. In that case, as the appendix shows, the growth rate of consumption is

$$\frac{\dot{c}_t}{c_t} = \frac{r_t(1 - \theta) - \rho}{1 - \beta}, \quad \text{if } r_t(1 - \theta) > \rho. \quad (3.6)$$

If, on the other hand,  $r_t(1 - \theta) \leq \rho$ , the economy is unconstrained from a financial standpoint. In that case

$$\frac{\dot{c}_t}{c_t} = 0, \quad \text{if } r_t(1 - \theta) \leq \rho. \quad (3.7)$$

Comparing 3.7 and 3.6 we see the finance-constrained economy has faster consumption growth whenever  $r_t(1 - \theta) > \rho$ , which is the requirement for being constrained. This is not because being finance-constrained is good for growth, but because in order to be constrained the economy has to enjoy a higher return on investment.

### 3.2. Firms

Firms are competitive and have the technology

$$y_t = x_t^\alpha g_t^{1-\alpha}, \quad (3.8)$$

where  $g_t$  is the flow of public services purchased. Firms choose  $x_t$  and  $g_t$  to maximize profits.

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<sup>5</sup>Note that, as is usual in this literature, we set the rate of discount equal to the world rate of interest. We also set the initial stock of bonds to zero for convenience, and without loss of generality.

The appendix shows that the solution to the firms' problem can be summarized by

$$r = \left[ \alpha^\alpha (1 - \alpha)^{1-\alpha} (1 - \tau) v^{-(1-\alpha)} \right]^{\frac{1}{\alpha}} \frac{1}{1 - \sigma}. \quad (3.9)$$

Note that while  $r$  is the price at which the household sells inputs to the firm, in equilibrium it will also be proportional to the rate of return on capital obtained by the firm. So below we refer to it loosely as the rental rate or the rate of return. Equation 3.9 shows this rental rate is a constant that depends on fiscal policies ( $\tau$ ,  $\sigma$  and  $v$ ) and on the technology parameter  $\alpha$ .

### 3.3. Government

The government cannot borrow or lend. Its budget constraint is

$$\tau y_t + \delta c_t = g_t (1 - v) + \sigma r_t m_t + z_t \quad (3.10)$$

where  $z_t$  is wasteful consumption by government bureaucrats. We now introduce the last distortion, related this time to government waste. Suppose simply that a share  $\omega$  of total tax revenue is wasted by bureaucrats. Then 3.10 becomes

$$(\tau y_t + \delta c_t) (1 - \omega) = g_t (1 - v) + \sigma r m_t \quad (3.11)$$

This is the constraint the government must abide by whenever making changes to fiscal policy.

### 3.4. The balanced growth path

If the economy is finance-constrained, consumption grows at speed 3.6, as we saw above. The appendix shows that for this to be a balanced growth path (BGP)—that is, for capital to grow at the same rate as consumption—the household must consume at each instant a fixed portion of its capital stock. This consumption rule is given by

$$\frac{c_t}{k_t} = \frac{r\theta + \rho(1 - \beta)}{1 + \delta}, \quad t > 0. \quad (3.12)$$

If the economy is unconstrained, the balanced growth path is even simpler. The case of no finance constraint occurs when  $r(1 - \theta) < \rho$ , implying the return on savings the household can get at home is smaller than the return it can get abroad. It follows that at time 0 the household will swap all of its inherited capital for holdings of the foreign bond, and keep that same portfolio forever.

Thereafter consumption is constant, as it appears in 3.7. The appendix shows that this requires that the household consume a constant share of its resources, given by

$$\frac{c_t}{k_t} = \frac{\rho}{1 + \delta}, \quad t \geq 0 \quad (3.13)$$

### 3.5. Welfare

The appendix shows that along a BGP welfare is given by the following expressions:

$$W_C = \frac{\log[r\theta + \rho(1 - \beta)] - \log(1 + \delta) - \log(1 - \beta) + \log k_0}{\rho} + \frac{r(1 - \theta) - \rho}{\rho^2(1 - \beta)}, \quad (3.14)$$

if the economy is finance-constrained, and

$$W_U = \frac{\log \rho - \log(1 + \delta) + \log k_0}{\rho} \quad (3.15)$$

if it is not.

### 3.6. Policy analysis

Consider now different policy reforms and their impact on growth and welfare. Recall first of all from 3.9 that fiscal policy parameters ( $\tau$ ,  $\delta$ ,  $\sigma$  and  $v$ ) and the inefficiency ( $\theta$ ) affect growth and welfare principally through their effect on the domestic rate of return  $r$ , and also possibly through other channels. We first look at second-best policies.<sup>6</sup> Then we examine the effect of lessening constraints on international capital movements holding other distortions constant. Finally, we examine the effect of the piecemeal removal of some distortions, holding other policies and wedges constant.

If the government were unconstrained by politics, what policies would it choose to maximize the welfare of domestic households? Holding  $\beta$  constant, it would set  $\theta = 0$  (eliminating external effects or solving coordination failures in the production of productive inputs),  $v = 1$  (charging fully for public services) and  $\omega = 0$  (eliminating wasteful government expenditure). With that, there is no need to subsidize productive inputs (so  $\sigma = 0$ ) and the taxes on consumption and on firm income can be abolished ( $\tau = \delta = 0$ ). The result would be that  $r = \alpha(1 - \alpha)^{\frac{1-\alpha}{\alpha}}$ , which depends only on the technology parameter  $\alpha$ .

### 3.7. Reducing the constraints to international capital mobility

**Barriers to inflows** A common reform in many countries is to reduce obstacles to capital inflows from abroad, while at the same time making it more attractive for foreigners to lend by increasing the chances of repayment. This might involve enlarging the set of domestic assets that can be used as international collateral, setting up escrow accounts which receive a part of export proceeds and can be used to guarantee debt service, making the economy more open and therefore more sensitive to sanctions in the case of non-payment, issuing bonds under foreign and not domestic law, etc. In our model, this all boils down to increasing the coefficient  $\beta$ . What effect can this have on growth and welfare?

From 3.15 we see that welfare is independent of  $\beta$  if  $r$  is low and therefore the economy is unconstrained by finance. This means that in the absence of reforms that increase the domestic return to investment, efforts at reducing barriers to international capital mobility or at better

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<sup>6</sup>First best policies would involve eliminating the external borrowing constraint. But in that case, if  $r > \rho$  the domestic household can make infinite profits arbitraging the rate of interest at home and abroad, which means that both consumption and utility are infinity. Clearly that is not a very interesting case.

integrating the economy to world financial markets will bear no fruit. An example of this is perhaps to be found in El Salvador, a country whose experience we discuss below. There dollarization has led to a massive fall in risk premia and a capital inflow, but with little discernible effect on growth.

The story is different if  $r(1 - \theta)$  is above the world rate of interest  $\rho$ . Then capital is struggling to get into the domestic economy, and lessening the constraint by enlarging  $\beta$  has beneficial effects on welfare, as 3.14 shows. That expression also reveals that the effect of  $\beta$  on welfare is increasing in the gap between  $r(1 - \theta)$  and  $\rho$ . That is, the more productive the domestic economy is, the greater the payoff from reducing external financing constraints. This suggests that efforts to reduce obstacles to capital mobility must be coupled with efforts to enhance domestic productivity. Below we analyze one such policy—subsiding the acquisition of productive inputs by firms.

Another way to put this result is in terms of most binding constraints. When the private local return on investment  $r(1 - \theta)$  is near or below the opportunity cost  $\rho$ , investors do not want to invest at home. Therefore, access to foreign capital and savings is not the most binding constraint. Domestic distortions that keep private profitability low are. Governments would be well advised to tackle these instead of spending scarce political resources on the relatively unproductive task of improving integration into world capital markets.

**Controls on outflows** Next consider a situation in which the economy is affected by the external effect described above, but the authorities have no tax or subsidy instruments with which to address the problem. We know that whether the economy is constrained or not will depend on whether  $r(1 - \theta)$  is larger or smaller than  $\rho$ .<sup>7</sup> If  $r(1 - \theta) < \rho$ , initially all inherited capital will flow out if the authorities allow it. Is this a good idea? If there are pre-existing controls on capital outflows, should the authorities lift them?

Recall that  $r(1 - \theta)$  is the private return to capital, while the social return is at least  $r$ . If  $r < \rho$  the local economy has relatively low productivity, so the capital outflow is efficient and welfare-enhancing. There is no reason for the authorities to struggle to keep capital in. But if  $r(1 - \theta) < \rho < r$ , then, we could have a situation in which the capital outflow is inefficient, and could usefully be avoided if the authorities do not lift any pre-existing controls on capital outflows.

The Appendix shows that if capital is kept in by controls, welfare is given by

$$W = \frac{\log(r\theta + \rho) + \log k}{\rho} + \frac{r(1 - \theta) - \rho}{\rho^2}. \quad (3.16)$$

If controls are lifted and all capital flows out, welfare is still given by 3.15. It follows that maintaining controls is welfare-improving if

$$\log(r\theta + \rho) + \frac{r}{\rho}(1 - \theta) > 1 + \log \rho, \quad (3.17)$$

or, equivalently, if the externality parameter is not too large.

The intuition is straightforward. If the externality is large, then the private savings decision is very distorted, and the cost of this distortion exceeds the productivity gain from forcing

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<sup>7</sup>Recall that in this case of  $v = 1$  and  $\sigma = \delta = \tau = 0$ ,  $r = \alpha(1 - \alpha)^{\frac{1-\alpha}{\alpha}}$ .

capital to stay. Otherwise, the gain from having capital yield the rate  $r$  at home instead of the lower rate  $\rho$  abroad predominates, and lifting controls on outflows is welfare-reducing.

This is a typical instance of the second best interactions discussed above. In the absence of the externality, lifting controls is never welfare-reducing and can be welfare-enhancing. But with one distortion (the externality) in place, eliminating the second distortion (the capital control) can for some parameters reduce welfare.

This logic underlied much of the 1980s literature on the order and sequencing of liberalization (see Edwards 1984 for an example). The main lesson of that literature was that the capital account liberalization should only be carried out after domestic reforms—closing the fiscal deficit, deregulating local banks—had been carried out. Our conclusion is the same, but with a twist. Preventing inefficient capital outflows calls for equating private and social rates of return. This may require not just eliminating government-imposed taxes and regulations, but also offsetting market failures like the externality discussed in the example.

Again, this is not an argument against deregulating the capital account, but rather for focusing on the most binding constraint at any point in time. When  $\theta$  is positive and large and private returns to investment are distorted, raising the private profitability of investment is the policy arena that yields the most bang for each political buck. Having addressed that issue, controls on capital movements can usefully be lifted.

### 3.8. Subsidizing productive inputs

Next suppose that the domestic return to capital is sufficiently large so that the economy is inflow-constrained. What are the effects of piecemeal reform of domestic institutions and policies, holding constraints on the capital account constant?

Start with the question of how much the government should subsidize productive inputs in the presence of an externality. The exercise can be motivated by common efforts to subsidize education, training or the adoption of new technologies. The optimal policy will depend crucially on the availability of budget resources, and on the distortions affecting the budget.

The problem can be formulated in the following way. We want to maximize welfare as it appears in 3.14, subject to the government budget constraint. The Lagrangean of this problem is

$$L = W_C + \lambda_B B(\tau, \delta, \sigma, v, \omega) \quad (3.18)$$

where  $B(\tau, \delta, \sigma, v, \omega)$  stands for government budget constraint 3.11, and where we can think of  $\lambda_B$  as the shadow value of fiscal resources. This is the same problem as in Section 2 of the paper, except that all direct effects on welfare along the equilibrium path are already contained in  $W_C$  and only the budget must be taken as a constraint.

The effect of increasing the subsidy is given by

$$\frac{dW_c}{d\sigma} = \frac{\partial L}{\partial \sigma} = \frac{\partial W_c}{\partial \sigma} + \lambda_B \frac{\partial B(\tau, \delta, \sigma, v, \omega)}{\partial \sigma} \quad (3.19)$$

The appendix shows that the direct effect  $\frac{\partial W_c}{\partial \sigma}$  is positive, and intuitively so: *ceteris paribus*, a higher subsidy increases the return on capital earned by the household, and enlarges consumption possibilities. It can be shown that this direct effect is increasing in  $\theta$ , the size of the distortion. The larger is  $\theta$ , the more binding is the high-distortion, low-return constraint, and therefore the more beneficial is the subsidy policy. But the sign of the overall effect of policy also depends

on  $\lambda_B$ , the shadow cost of fiscal resources. If these resources are plentiful or the cost of raising additional resources is low, their shadow value is small and hence spending more on subsidies, given their positive effect on welfare, is beneficial.

In turn, the magnitude of  $\lambda_B$  depends on which fiscal instrument is changed to offset the cost of higher subsidies. Consider what happens if the consumption tax is used, as is often the case in developing countries: larger education or R&D expenditures are financed via a higher VAT. The optimal consumption tax rate is given by

$$\frac{dW_c}{d\delta} = \frac{\partial L}{\partial \delta} = \frac{\partial W_c}{\partial \delta} + \lambda_B \frac{\partial B(\cdot)}{\partial \delta} = 0 \quad (3.20)$$

Using this last expression in 3.19 yields<sup>8</sup>

$$\frac{dW_c}{d\sigma} = \frac{\partial L}{\partial \sigma} = \frac{\partial W_c}{\partial \sigma} + \frac{\partial W_c}{\partial \delta} \frac{d\delta}{d\sigma} \Big|_{B(\cdot)=0}. \quad (3.21)$$

Since higher consumption taxes have a negative effect on welfare ( $\frac{\partial W_c}{\partial \delta} < 0$ ) and taxes have to go up when the subsidy rate goes up ( $\frac{d\delta}{d\sigma} \Big|_{B(\cdot)=0} > 0$ ), the indirect effect is negative. The overall impact –taking into account both the direct and the indirect effect– is ambiguous, and depends on  $\sigma$  and  $\delta$  themselves and on what other distortions are present.

The appendix works out the case in which all other tax distortions are assumed away, but the externality remains in place, and so does the possibility of government waste ( $\omega \geq 0$ ). There we show that the optimal subsidy depends on the magnitude of this distortion, that too large a subsidy can reduce welfare, and that this danger in increasing the larger is government waste. A subsidy level  $\sigma = \theta$  fully offsets the adverse effects of the externality on savings and investment. But it is only desirable to try to achieve this subsidy if government waste has been eliminated ( $\omega = 0$ ). Otherwise the welfare-maximizing subsidy rate is smaller.

Put in terms of priorities for reform, this exercise reveals that in the presence of an externality or another market failure and without other policy distortions such as government waste, imposing a small subsidy is likely to be raise-welfare.<sup>9</sup> But in a process of piecemeal reform, in which the prior removal of those policy-induced distortions cannot be guaranteed, the situation is dicier. As in the previous exercises, the net effect of a larger subsidy on welfare is most likely to be positive when the direct effects is large –that is, when incentives for domestic investment in technology, human capital or other productive inputs are particularly distorted.

### 3.9. Pricing public services

Consider next another common reform: raising the price the government charges for public services in order to confront users with the true resource cost of providing these services. When will such a reform enhance welfare? How does the answer to this question depend on the other distortions present?

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<sup>8</sup>Recall that  $\frac{d\delta}{d\sigma} \Big|_{B(\cdot)=0} = -\frac{\partial B/\partial \sigma}{\partial B/\partial \delta}$ .

<sup>9</sup>We just say likely because the conclusion depends on how the subsidy is financed. With financing coming from consumption taxes, as in the example here, welfare is always increasing in the subsidy as long as  $\sigma \leq \theta$ .

The Lagrangean of this problem is the same as 3.18. The effect of increasing the price of public services is given by

$$\frac{dW_c}{dv} = \frac{\partial L}{\partial v} = \frac{\partial W_c}{\partial v} + \lambda_B \frac{\partial B(\tau, \delta, \sigma, v, \omega)}{\partial v} \quad (3.22)$$

The appendix shows that, quite naturally,  $\frac{\partial W_c}{\partial v}$  is negative: *ceteris paribus*, a higher price for the publicly-provided input reduces the return on capital earned by the household, and reduces consumption possibilities. Again the sign of the overall effect depends on  $\lambda$ , the shadow price of fiscal resources. If this price is high, the net impact on welfare of raising the price can be positive, since valuable fiscal resources are freed up.

Consider the case in which the value added tax rate is fixed at zero, and the additional fiscal resources are used to lower corporate income taxes. The effect on welfare of a change in the corporate tax rate is given by

$$\frac{dW_c}{d\tau} = \frac{\partial L}{\partial \tau} = \frac{\partial W_c}{\partial \tau} + \lambda_B \frac{\partial B(.)}{\partial \tau} \quad (3.23)$$

Setting this last expression equal to zero and using the resulting expression in 3.22 one obtains

$$\frac{dW_c}{dv} = \frac{\partial L}{\partial v} = \frac{\partial W_c}{\partial v} + \frac{\partial W_c}{\partial \tau} \frac{d\tau}{dv} \Big|_{B(.)=0}. \quad (3.24)$$

The indirect effect has two negative components: welfare falls as corporate taxes rise ( $\frac{\partial W_c}{\partial \tau} < 0$ , because of the depressing effect of such taxes on the return on investment); and taxes can fall as the price of public services rises ( $\frac{d\tau}{dv} \Big|_{B(.)=0} < 0$ ). The product of the two being positive, the overall effect of the policy change is ambiguous.

In the appendix we show that

$$\text{sign} \left( \frac{\partial L}{\partial v} \right) = \text{sign} (1 - \tau - (1 - \omega) v) \quad (3.25)$$

That is, the policy can be welfare-improving if  $\tau$ ,  $\omega$  and  $v$  are not too large. Another way of seeing this result is to notice that the optimal price for public services is given by

$$v = \frac{1 - \tau}{1 - \omega} \quad (3.26)$$

Charging a full price of one is desirable only if  $\omega$  is no smaller than  $\tau$ . This is intuitive: a large waste wedge  $\omega$  means that collecting income taxes is particularly inefficient, and therefore it pays off to make room in the budget to cut taxes by increasing the price charged for public services.

The policy message is similar to that of the earlier exercises. Since here raising public sector prices aligns relative prices and also releases fiscal resources, the net effect of the policy on welfare is most likely to be positive when the social cost of taxations is largest –for instance, if a non-trivial share of tax revenue is wasted.

### 3.10. Political constraints

The existence of a political budget constraint that limits policy choices can also be applied in this context. Let that constraint be denoted by  $\Pi(\tau, \delta, \sigma, v, \omega, \theta)$ , where we have placed only the externality parameter and the policy instruments as arguments, but any other variables could enter there as well. Suppose also that fiscal resources are plentiful, so that we need not take the government budget as an additional constraint on the policy problem.

For the sake of argument, focus on the policy of tackling the distortion  $\theta$  directly via regulation—for instance, by tinkering with patent law, changing labor market rules, reforming the structure of state universities or technology institutes, etc. Since any of these changes is likely to arouse political opposition from affected groups, the political budget constraint is relevant and probably binding.

The Lagrangean of the problem is

$$L = W_C + \lambda_\Pi \Pi(\tau, \delta, \sigma, v, \omega, \theta). \quad (3.27)$$

The effect of the proposed reform is given by

$$\frac{dW_c}{d\theta} = \frac{\partial L}{\partial \theta} = \frac{\partial W_c}{\partial \theta} + \lambda_\Pi \frac{\partial \Pi(\tau, \delta, \sigma, v, \omega, \theta)}{\partial \theta}. \quad (3.28)$$

Even if  $\frac{\partial W_c}{\partial \theta}$  is negative, which presumably it is, the expression is of ambiguous sign since the reform generates political costs, and the effect of those costs on welfare may be large if  $\lambda_\Pi$  is large—that is, if the political budget constraint binds tightly. That is, we have to allow for the possibility that reducing distortion  $\theta$  results in too large foregone benefits from reforms in other areas) relative to its direct economic benefits. Again, and as in all other policy exercises, the reform should only be undertaken if the direct benefit is estimated to be large.



## 4. Moving from theory to practice

How can one apply the results of this rather abstract analysis of policy reform and its pitfalls? How do we locate the distortion(s) with the largest potential impact on economic growth?

Our strategy is to start with some of the proximate determinants of economic growth. As the growth model above made clear and we will discuss further below, economic growth depends on the returns to accumulation (broadly construed), their private appropriability, and on the cost of financing accumulation. The first stage of the diagnostic analysis aims to uncover which of these three factors pose the greatest impediment to higher growth. In some economies, the “constraint” may lie in low returns, in others it may be poor appropriability, and in yet others too high a cost of finance.

The next stage of the diagnostic analysis is to uncover the specific distortions that lie behind the most severe of these constraints. If the problem seems to be poor appropriability, is that due to high taxes, corruption, or macro instability? If the problem is with the high cost of finance, is that due to fiscal deficits or poor intermediation? This approach enables the design of remedies that are as closely targeted as possible.

We illustrate our strategy with the help of Figure 1, which attempts to organize thinking about low growth, its causes and cures. That decision tree starts at the top with two facts gleaned from our growth model.

First, along a (constrained) balanced growth path consumption and capital grow according to

$$\frac{\dot{c}_t}{c_t} = \frac{\dot{k}_t}{k_t} = \frac{r(1-\theta)(1-\psi)p - \rho}{1-\beta}. \quad (4.1)$$

This is equation 3.6 above, enlarged to include two additional exogenous variables:  $\psi$ , which summarizes all kinds of taxation of capital and  $p$ , which is the (instantaneous) probability that an investor will in fact be able to reap the fruits of his investment. A high  $p$  could reflect microeconomic risks (corruption, crime) and macro risks (currency crises and financial meltdown).

Second, the return on capital  $r$  is given by

$$r = \left[ \alpha^\alpha (1-\alpha)^{1-\alpha} a (1-\tau) v^{-(1-\alpha)} \right]^{\frac{1}{\alpha}} \frac{1}{1-\sigma}, \quad (4.2)$$

which is 3.9 enlarged to include the parameter  $a > 0$ , which is an indicator of total factor productivity: the higher  $a$ , the higher is firm output for a given level of inputs used.

These two equations summarize the possible factors that can affect growth performance. An exercise of *growth diagnostics* simply consists of reviewing and analyzing these factors to ascertain which of these are the most binding constraints on growth. As the analysis above reveals, all factors (including market distortions and policy wedges) are likely to matter for growth and welfare. The challenge is to identify the one that provides the largest positive direct effect, so that even after taking into account second-best interactions and indirect effects, the net impact of a policy change is beneficial (and hopefully sizeable).

It helps to divide the factors affecting growth into two categories.

#### 4.1. High cost of financing domestic investment

This is a case in which growth is low because, for any return on investment, accumulation is kept down by either a high  $\rho$  or a low  $\beta$ . Stretching definitions slightly, we can interpret  $\rho$  as the international rate of interest relevant for the economy in question. A high  $\rho$  reflects high spreads in international lending. Similarly,  $\beta$  may be taken to summarize the conditions of access to capital markets, with a low  $\beta$  indicating high collateral requirements, credit ceilings, high fees, etc.

In turn, these phenomena could be connected to two kinds of policy problems

- *Bad international finance*: country risk is still too high, foreign direct investment conditions unattractive, debt maturity and denomination increase macro risk, there remain excessive regulations on the capital account, etc.
- *Bad local finance*: when domestic capital markets work badly, collateral cannot be aggregated properly among domestic borrowers (Caballero and Krishnamurty, 2003) and the risk of banking crises and non-payment rises. Both of these increase the cost of foreign capital.

#### 4.2. Low private return to domestic investment

The other component of the growth equation is given by the private expected return on domestic investment, given by  $r(1 - \theta)(1 - \psi)p$ . Given 4.2, a low such return can be due to:

- *Low  $p$* : high micro or macro risks.
- *High  $\theta$* : large externalities, spillovers, coordination failures.
- *Low  $a$  or  $\sigma$* : low productivity, too little technology adoption or “self-discovery,” weak public incentives.
- *High  $\tau$  or  $\psi$* : high tax rates and/or inefficient tax structure.
- *High  $v$  or low  $g$* : insufficient infrastructure, high transport, telecommunications or shipping costs.

#### 4.3. Moving down the multilemma

The tree then naturally organizes the policy questions, which can be asked in logical order. Is the problem one of inadequate returns to investment, inadequate private appropriability of the returns, or inadequate access to finance?

If it is a case of low returns to investment, is that due to insufficient supply of complementary factors of production (such as human capital or infrastructure)? Or is it due to poor access to appropriate technologies? If it is a case of poor appropriability, is it due to high taxation, poor property rights and contract enforcement, labor-capital conflicts, or learning externalities?

Or alternatively: if it is a case of poor finance, are the problems with domestic financial markets or external ones?

Moving down the branches of the decision tree is tantamount to discarding candidates for the most binding constraint on growth. The overarching lesson from our theoretical analysis is that it is this constraint, once identified, that deserves the most attention from policy makers.

## 5. Country experiences: identifying the binding constraints

We now have a framework to think of growth diagnostics. In this section we apply our approach to three countries with three very different growth experiences: Brazil, El Salvador and the Dominican Republic.

The first two countries have had lackluster growth in spite of quite impressive reforms. The last had a sustained period of very rapid growth triggered by rather modest reforms, but more recently has stumbled into a financial crisis from which it has yet to extricate itself.

Both Brazil and El Salvador made major efforts at dealing with their perceived problems during the 1990s. Brazil returned to democracy in the 1980s, started opening up its economy in the early 1990s, stopped mega-inflation in the mid-1990s through exchange-rate based stabilization, implemented privatization and financial reform and after 1999 was able to maintain price stability while floating the currency. El Salvador stopped its civil war, negotiated successful peace agreements, reformed its judiciary and police, stabilized prices, opened up the economy, privatized utilities and social security and improved social services. Both countries underwent a brief period of decent growth—or should we say recovery—but in the last five years growth has been quite lackluster. As Table 1 indicates, in spite of the improvements in the political and policy framework over the last decade, Brazil grew slower than the U.S. and barely 0.3 percentage points faster than the OECD average, in spite of the fact that its rate of demographic growth—and the rate at which its working-age population expands—is over 1 percentage point per year higher. In other words, there was no catch-up or convergence. Moreover, both economies slowed down quite significantly in the 1998-2003 period. And future prospects look modest. In an environment of favorable external conditions and coming back from a soft patch, these economies are unlikely to grow much faster than 4 percent in 2004 and 2005. The obvious question is why. What is the growth diagnostic? What should the authorities focus on in each country?

It will be useful to contrast El Salvador and Brazil with the Dominican Republic, a country with a much less impressive reform effort and with significantly weaker institutions. Its reform history starts with a currency crisis in the late 1980s addressed with an effective stabilization policy and some trade liberalization, but the reforms were nowhere as significant as in the other two countries. Nonetheless, the Dominican Republic achieved more than a decade of very fast growth interrupted only in 2002 by a banking crisis.

We will argue that Brazil and El Salvador look like a case of wholesale reform that eliminate some distortions but not necessarily the binding constraint. The Dominican Republic, by contrast, found a way around that binding constraint with minor reform effort. Its eventual crash indicates that as growth proceeds, the shadow prices of other constraints—such as that of weak institutions— increase and these may become eventually the binding constraint on growth.

### 5.1. Brazil versus El Salvador: identifying the binding constraints

Brazil and El Salvador are obviously very different countries in terms of size, history and structure. But they share one feature: lackluster growth in spite of significant reform. The case of El Salvador is particularly puzzling: broad ranging reforms were associated with a short-lived

growth spurt and then relative stagnation since 1996.<sup>10</sup> Let us apply our framework to see if Brazil and El Salvador share a similar diagnostic.

For a long time, promoting saving and capital accumulation was the dominant idea in development policy. Under this view, low growth could be explained by an insufficient increase in the supply of factors of production, physical capital in particular. While “capital fundamentalism” has long been discarded (along with Soviet style planning), it has been replaced more recently with a focus on human capital. Increasing the supply of human capital—through a greater health and education effort—is expected to lead to a faster accumulation of these assets and hence to a higher level of income. Can the poor growth performance in Brazil and El Salvador be explained by low saving and education effort? Can these variables explain the difference with the Dominican Republic?

On the face of it, there are two elements that make this argument compelling for El Salvador and Brazil. Both countries have low savings and investment rates. Second, both countries have relatively low educational attainment. The investment rate has averaged around 20.8 percent and 17.4 percent for Brazil and El Salvador respectively, during the decade of the 1990s. The saving rate, including the remittances as part of national income, was even lower as both countries ran current account deficits which averaged -2.2 percent and -1.8 percent respectively.

A similar comment can be made about human capital. The supply of education in both countries—measured as the average years of schooling of the labor force—is at the bottom of Latin American countries (Figure 2), although it has been growing in both countries at over 1 year per decade.

When is lack of an adequate saving and educational effort a basic reason for the country’s stagnant growth performance? For this story to be plausible, one should be able to observe high returns to both capital and schooling. The economy must be willing to gobble up additional resources, but prevented from doing so because these are just not adequately provided. Hence, we should observe the tightness of the constraint in the price society is willing to pay for the scarce resource.

Let us deal first with savings. If savings were scarce, one would observe a high foreign debt or a high current account deficit—a signal that the country is using or has already used up its access to foreign savings to the hilt, given the paucity of domestic savings. Alternatively, one would observe a high willingness to remunerate savings through high interest rates to depositors or government bondholders.

Here Brazil and El Salvador provide completely different stories. Time and again, Brazil has had serious difficulties with its balance of payments. Recently it has accumulated large external liabilities, which have allowed it to invest more than its domestic savings and has run against the willingness of foreign markets to keep funding it. Foreign debts exceed 500 percent of exports.

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<sup>10</sup>A recent World Bank study (Loayza, Fajnzylber and Calderón 2002) implicitly finds that the decline in the rate of growth in El Salvador after 1996 is difficult to explain. In their model, improvements in secondary school enrollment, availability of private domestic credit, the increase in openness and in phone lines, the low inflation rate and the absence of banking crises should have compensated for the increase in the initial level of income, the declining output gap, the increased real appreciation of the currency and the adverse terms of trade shifts. This should have left growth unchanged in the second half of the 1990s relative to the first half. Instead, growth declined by 2.8 percent. Hence, they are unable to account for the growth decline. In line with this, Lopez (2003) attributes the growth decline to “temporary,” business-cycle related factors—an unsustainable boom in the early 1990s followed by a pricking of the bubble in the second half. This leaves open the question of why the economy has not performed better in the first decade of the new century and why prospects are not more encouraging.

The country has been perceived as being on the brink of bankruptcy, as indicated by the fact that country risk has until recently been above 1000 basis points and for a while even above 2000 basis points (Figure 3). The country has been rescued from financial disaster by massive injections of official international support and by a recession and a real depreciation that have reduced the external deficit since 2001.

On the domestic front, interest rates have been incredibly high. Ex-post real overnight rates have been significantly above 10 percent and are currently hovering over 8 percent.

In addition, Brazil's growth performance has moved *pari passu* with the tightness of the external constraint. When the external constraint is relaxed –say, because of an increase in the general appetite for emerging market risk or because of higher commodity prices, as in recent months– the economy is able to grow. But when the external constraint tightens real interest rates increase, the currency depreciates and growth declines.

In these respects the situation in El Salvador is very different. In the past the country has not used up its access to foreign savings: its total gross external debt stands at less than 30 percent of GDP and it enjoys an investment grade credit rating. Nor is the country currently using foreign savings rapidly: the current account deficit has averaged 2 percent of GDP in the past 5 years. Nor is the country willing to remunerate savings at high rates: it needs to pay among the lowest interest rates in the region to attract demand for deposits or government bonds. Its banks have more liquidity than domestic credit demand can soak up, so are actively lending to enterprises in the neighboring countries in the region. And perhaps the most telling indicator that El Salvador is not saving-constrained is that the external savings that the dramatic boost in remittances has enabled have not been converted into investment. As Figure 4 shows, the decline in domestic savings has substituted almost one-for-one for the increase in remittances, with no discernible effect on the total investment effort. So there are no symptoms that El Salvador's growth is constrained by lack of savings.

In fact, Brazil and El Salvador are also at opposite extremes in terms of the cost of domestic financial intermediation. In a comparative study by Barth, Caprio and Levine (2001) the net interest margin was reported to be 11.5 percent in Brazil and 3.7 percent in El Salvador while the overhead costs were 9.8 in Brazil and 3.2 percent in El Salvador. In spite of this, credit to the private sector was almost the same in both countries (25.8 in Brazil and 27.5 in El Salvador).

All this suggests that El Salvador is a country where returns to capital are low. The country invests little not because it cannot mobilize the resources to invest –although savings are low– but because the country does not find productive investments in which to deploy the resources. There is ample access to foreign borrowing, deposit rates are low and intermediation costs are among the lowest in Latin America. In terms of our decision tree in Figure 1, it seems clear that El Salvador is a low-return country.

Brazil, by contrast, is a high return country. In spite of very high overnight real interests and very high intermediation costs, investment still outstrips domestic savings and the country has used its capacity to borrow abroad from the rest of the world to the hilt. The investment rate in Brazil and credit to the private sector would be dramatically higher if the prevailing cost of capital were that of El Salvador.

A similar contrast between the two countries emerges when looking at education. If education were the constraint on growth one would expect to see high returns to the few who get educated. Table 3 shows different measures for the return to education for a sample of 21 countries. Figure 5 shows a scattergram of returns to education and years of schooling. The picture that emerges

is clear: while the years of schooling of the labor force are low both in El Salvador and in Brazil, the returns are quite different. Brazil has just about the highest returns in Latin America while El Salvador is below the regional average. Hence, the evidence suggests that lack of educational effort is not at present a principal source of low growth in El Salvador, while it may well be part of the story in Brazil.

What is at stake here is whether a sudden increase in the supply of more educated citizens is likely to unleash significantly faster growth at the present time. If growth is being constrained by other factors, other things equal, more education is likely to lead mainly to lower returns to human capital, not to higher incomes. In this respect, Brazil and El Salvador look quite different.

Hence, the challenge is to identify what constraints may be behind the low returns to investment in El Salvador. By contrast, in Brazil the challenge is to explain why the country is constrained in external markets and why domestic savings do not rise to exploit the large returns to investment.

## **5.2. Misdiagnoses in El Salvador**

As Figure 1 indicates, the low investment in El Salvador may be the consequence of many potential distortions which keep private returns low, even if social returns may be high. One possibility is that the social returns are not privately appropriable. Appropriability problems can emerge from many fronts. We can group these into four major areas:

- High taxes: Actual or expected explicit taxes make private returns low and hence investment unattractive, although social returns may be high.
- Macroeconomic imbalances: Unsustainable fiscal or external accounts usually presage the need for implicit taxation or expropriation through surprise inflation, depreciation, default or banking crises. In anticipation, country risk and interest rates rise, further depressing investment.
- Poor definition and protection of property rights: Productive investments may be limited by the expectation that investors will not be able to appropriate the returns because their claims are ill-defined or poorly protected, through corruption, judicial manipulation or outright crime. Measures to avoid these problems create additional high transaction costs which may render investment unattractive.
- Uncertainty: Doubts—deriving from political or other factors—regarding the commitment to the current rules of the game create excessive risks about the environment in which projects will evolve.

The issues involved here are multiple and complex. We will review them quickly and assess their relative importance in El Salvador.

### **5.2.1. Concerns about excessively high taxation**

Clearly, this is not a problem that can explain low growth in El Salvador. The country has a very moderate income tax with a marginal rate at 25 percent, well below the rate that global

corporations pay in their home country. Moreover, the country has eliminated the double taxation of capital. The value added tax, at 13 percent, is moderate by regional standard and a fraction of that applied in Western Europe. Tariffs are low, and the economy is one of the most open in the region.

In fact, it is easier to argue that El Salvador may be suffering from the opposite problem. Tax revenue may be so low that the government lacks the resources to provide an adequate supply of public goods needed to make economic activity productive. The Global Competitiveness Report of 2002-2003, which views smaller government spending as a virtue, ranks El Salvador in 14th place in a sample of 80 countries in terms of low government spending. Unfortunately, the world leader in this indicator is Haiti. Even within Latin American countries, El Salvador's public spending appears low. This may be a reason why the country ranks poorly in measures of the quality of infrastructure (especially in roads, rail and ports) and public education.

We conclude that excessive current or expected explicit taxation is not a sensible explanation of El Salvador's development challenge.

### **5.2.2. Concerns about macro stability**

When the economy is on an unsustainable path—e.g. when the country as a whole or the government are accumulating obligations at a rate that will compromise their ability to abide by them—participants in the economy know that the current rules of the game will need to be abandoned and act to protect themselves from the expected changes rather than engage in productive investments. Problems of macro stability can be generated by imbalances arising from different areas. The fiscal accounts may be in deficit and public debt may be increasing faster than the capacity to service it. Longer term fiscal commitments, in particular the actuarial liabilities of the government vis à vis the pension system, may bankrupt an otherwise solvent government. Monetary policy may be too loose causing a loss of international reserves and an eventual large depreciation. Banks may be taking excessive risk, which can end up in a disruptive crisis that often weakens both fiscal and monetary stability. The country may be running large external imbalances that translate into reserve loss or a rapidly rising external debt and signal the need for eventual currency depreciation. The real exchange rate may be misaligned, limiting the profitability and growth of export and import-competing sectors.

The question is to what extent the relatively disappointing growth of the last few years can be interpreted mainly as the outcome of limitations on these fronts. It is worth noting that the Global Competitiveness Report 2002-2003 ranked El Salvador as number 33 out of 80 countries in the world in terms of its macro environment, well ahead of all Central American countries and most Latin American countries, except for Chile. Underpinning this ranking was the country's low inflation rate, low bank spreads, good access to credit, moderate fiscal deficit, small government and good credit rating. While macro problems may appear in the future, especially if not enough attention is paid to them, it seems reasonable to argue that El Salvador's low growth in the past five to six years cannot be easily explained in terms of macroeconomic imbalances. More likely, the puzzle is precisely why is it that a relatively good macro environment has not generated faster growth.

### 5.2.3. Concerns about contract enforcement and property rights

The role of institutions in development has received increasing attention in recent years. Could it be that El Salvador is being held back by an inadequate institutional environment?

Our answer is negative. The Heritage Foundation ranked El Salvador 17th in the world in 2002 in terms of “economic freedom” and third in Latin America (behind only Chile and the Bahamas). According to Lopez (2003, 2), El Salvador ranks “always near the top in terms of the World Bank’s Country Policy and Institutional Assessment ratings.” On the financial front, El Salvador ranks very favorably in indicators associated with credit availability and cost. This is telling because financial markets are particularly sensitive to problems of contract enforcement. Moreover, in 2003 the World Economic Forum ranked El Salvador third among Latin American countries in terms of low corruption and low tax evasion (after much wealthier Chile and Uruguay) and second in the efficiency with which it uses its public funds (after Chile)—see Figures 6 and 7.

If anything, El Salvador looks like a country with very good institutions for its low level of income. In fact, it ranks better than Brazil in most indicators in spite of the fact that it has a level of per capita income which, at US\$ 3,530 for 2003 is less than half that of Brazil (US\$ 7,720 ). It is hard to argue that it is the bad institutional framework that is keeping returns to capital low.

### 5.2.4. Infrastructure, labor and real exchange rate misalignment

Other stories in our decision tree involve rigid labor markets and bad infrastructure. Here again, it is hard to make the case that these factors are critical to the growth story. Electricity and telecommunications have been privatized and have undergone a major expansion. While the country ranks low in the Global Competitiveness report in terms of roads, ports and rail infrastructure, there have also been important recent improvements in these areas with scant impact on the investment rate of other sectors.

The same can be said of labor institutions. The country has relatively low restriction to hiring and firing and low payroll taxes. These limited sources of rigidity cannot account for low investment returns.

However, the country does have a high minimum wage in relation to the average wage. In addition, the country is dollarized which means that the exchange rate cannot move to clear the labor market. The real exchange rate appreciated quite dramatically between 1974 and 1994 but has remained stable since (Figure 8). Such a long term stable level in the context of low current account deficits cannot be anything other than an equilibrium phenomenon (as the labor market should clear in less than a decade!). In part the appreciation reflects the rise in remittances which represented 17.6 percent of GDP in 2002. These external flows increase the supply of foreign exchange and in addition are caused by a contraction in the domestic supply of labor. Both effects tend to appreciate the real exchange rate. Hence, even if the exchange rate is misaligned by some measures, it does not seem to be unsustainable or to be generating fears of a currency crisis down the road. In this sense it does not seem like a central explanation for the mediocre growth of recent years.



### 5.3. Self-discovery and innovation

We have discarded a set of traditional arguments to account for the low returns to investment in El Salvador. These have included insufficient factor accumulation and low appropriability arising from different sources.

The third element in our growth framework is productivity and innovation. What we have in mind here is not innovation and R&D in the sense that these terms are used in the advanced economies, but the ability to identify and generate higher productivity activities within the Salvadoran context. These are new, non-traditional products that could be profitably produced in El Salvador, but which do not currently attract investment because of various market shortcomings (see Hausmann and Rodrik 2003 for a general discussion).

To get a sense of how this may be the engine of growth, suppose that through either serendipity or conscious action, a new product appeared on the scene. To make matters more concrete, let us say that it is a cotton seed that is pest-resistant and hence does not require the expensive and environmentally damaging insecticide spraying, as did the varieties that caused the collapse of the cotton industry in the late 1970s and early 1980s. This new seed would most likely cause a major expansion in investment and production of cotton in El Salvador. If the product could be freely traded internationally it could become an important new item in the country's export basket, either directly or in the form of yarn, textile products or apparel. Investment would pick up, but the driver in this story is not investment itself, but the technology and innovation that caused that investment to be productive.

One can easily imagine the opposite story: suppose a new pest affects an existing sector, like roya and broca in coffee. Or suppose that there is a Brazil-specific technological improvement in coffee or that Vietnam is able to adapt coffee to its geographic conditions. This would have the effect of lowering profitability of coffee in El Salvador, and hence would lead to less investment and growth. Again, here the driver is technology and innovation, whether at home or abroad, not savings, education or appropriability.

If we interpret El Salvador in this light, we can make the following argument. El Salvador is facing bad news in its traditional sectors, and the speed at which it comes up with new ideas in other areas has not been able to compensate. The country has lost its cotton industry completely. Coffee is in crisis. Nobody has been able to make a decent living in the international sugar market. These "ideas", after creating hundreds of thousands of jobs in El Salvador, are in some sense dying. To achieve growth, new productive ideas must take their place. The speed at which these ideas appear and their economic significance are critical. The only significant new sector has been the maquila industry and this barely represents 480 million dollars (slightly more than 3 percent of GDP) in net exports. The absence of new ideas explains why the expected return to current investment ideas is low, and why investment and growth are low. It is not because of lack of savings. It is not solely because of fear of taxation, expropriation or fraud. It is because the actual real returns to investment are low given the absence of profitable investment opportunities.

El Salvador has opened up to the world, stimulated foreign investment and endeavored to protect property rights. Is that not the way to encourage innovation and secure sufficiently rapid technological advances? The Salvadoran experience suggests that the answer may well be negative. This may be due to the fact that the innovation that matters to countries such as El Salvador—identifying and operating profitable new activities—is substantially more problematic

than this simple picture assumes. Many technologies require significant local adaptation. Today's most productive corn producers are in the Mississippi valley. However, in pre-Columbian times, corn could not be produced at such high latitudes. Mexico was the ideal place for the crop, prompting a whole civilization. It required genetic adaptation to get corn to grow in Kansas and this took literally centuries to achieve.

The problem with innovation is that it is hard to create but easy to copy or imitate. This means that part (or most) of the returns to innovation spill over to other people. This reduces the expected private return to innovation and hence may cause it to be inadequately supplied. In response to this, the world has opted to consider the output of innovators as an item of property that needs protection: hence the development of patents, copyrights and other forms of intellectual property rights protection. These grant monopoly power over an idea to its creator.

The development process in less advanced countries is largely about structural change: it can be characterized as one in which an economy finds out –self-discovers– what it can be good at, out of the many products and processes that already exist. The problem is that the ideas that are valuable at low levels of development are typically not patentable. For example, the idea that an Ethiopian seed-coffee-could be planted in the hills of Central America was of historic importance, leading to a dramatic transformation of the fabric of society, but yet not patentable. Desh, the company that discovered that you could produce and export shirts in Bangladesh, generated enormous effects in that country, but it reaped only a small parts of those gains: hundreds of new companies were set up and these got the know how by raiding the managers and workers of Desh.

New ideas that lead to new sectors may require specific public capital or changes in rules and regulations that were designed in ignorance of their negative consequences to the sector. Coffee requires not education, research and training in general, but in the specifics of coffee. Road and infrastructure networks need to take account of the areas where the new activities can expand. New forms of contracting, transacting and financing may be required. The whole maquila industry requires a specific form of custom treatment.

Ideas may also be limited by high setup costs that generate de facto economies of scale, at least at the beginning. The productivity of El Salvador as an exporter of Hawaiian pineapple is not only dependent on the properties of the climate, soil and quality of farm management. It also depends on the existence of a trading company with sufficient volume of activity to solve the international trade problems that often afflict fresh produce, such as speed of transportation and phytosanitary conditions. These issues escape the control of any individual grower, and can only be addressed effectively when a sufficient volume of produce needs to be marketed.

The problems of self-discovery in tradable activities are likely to be potentially more important and the payoffs to addressing them much larger. They are more important because, contrary to non-tradable activities, any new firm in a given country will start operating in a competitive market, as other suppliers of the good already exist in the world. Think of, say Desh producing shirts in Bangladesh. A real depreciation acts as a generalized incentive for self-discovery in tradeables.. It makes expected profits larger, attracting experimentation and self-discovery. Interestingly, Hausmann, Pritchett and Rodrik (2004) find that transitions to higher rates of sustained growth tend to coincide with periods of depreciated exchange rates. In this sense El Salvador contrasts with Brazil, a country that has had a sustained period of a very weak real exchange rate since 1999. Now Brazil is seeing a boom in manufactured exports.

They rose at the rate of 26.9 percent in the first half of 2004 in relation to the same period of the previous year. El Salvador cannot push self-discovery through this mechanism, making an active promotion policy that much more important.

In conclusion, problems with self-discovery seem to be the binding restriction on growth in El Salvador. That may well be the appropriate focus of policy in a development strategy for this country.

#### 5.4. Explaining slow growth in Brazil

As opposed to El Salvador, Brazil is not in such dire need of ideas on where to invest. It has more ideas than investible funds. As argued above, it is rationed in international capital markets to which it pays a hefty premium to access funds. These markets are concerned by the fact that the country already owes an uncomfortably large amount of money and hence asset prices tend to go up when they hear about positive innovations to the current account, implying that the country will stop its borrowing binge. Foreign market participants would like to see Brazil ask for less money, not more. Because of this borrowing constraint, the country has been undergoing a painful process of current account adjustment, which has inevitably involved more import compression than export growth since at least 1998. If it were not for a US\$ 50 billion in IMF support in 2002, the situation might well have become unmanageable. Only in 2004 has the growth performance improved due to a very rapid rise in exports, in part because of higher commodity prices (which also stimulate output) and in part because of the increase in the volume of manufacturing exports. And still, with inflation running under 8 percent and projected to be less than 7 percent in 2005, the upward sloping nominal yield curve starts with the overnight rate at 16.5. Add to it the large lending spread and it is incredible that the country still finds projects worth over 20 percent of GDP that can pay those returns.

This is likely a case of a country facing an external borrowing constraint to its growth. In the context of the model in the previous section, this restriction is related to the fact that given the enforcement technology present (the coefficient  $\beta$ ) the country would like to borrow more than the world thinks it can force Brazil to repay. This implies that the problem is not lack of investment ideas. In fact, these exceed first, the willingness of residents to save and second, that of non-residents to lend. Let's deal with each of these in turn.

Models of sovereign risk assume that what makes international lending enforceable is some punishment technology for opportunistic behavior by the borrower. Since Eaton and Gersovitz (1981) a typical assumption is that trade sanctions are the typical penalty that lenders can impose and hence the volume of international trade is related to the credit ceiling lenders would like to avoid breaching.

In this context, Brazil has been a very closed economy with almost twice the population of Mexico but less than half of its exports. While the export to GDP ratio has risen in recent years this has been due mainly to the decline in the dollar value of GDP at market prices. If we take GDP at its purchasing power parity, exports are well below 10 percent of output. Hence, while the external debt looks high as a share of GDP, it looks astronomical as a share of exports. One can imagine a policy to make foreign investors even more eager to lend by raising the credit ceiling. However, *ceteris paribus* this is bound to lead to a short-lived acceleration of growth until the economy reaches its new credit ceiling.

Alternatively, the external credit ceiling may be related to doubts about the government's

capacity to pay its debts. If this is the case, improving fiscal fundamentals may actually relax the external constraint and facilitate faster growth. However, it is important to remember that in the case of Brazil, the public debt is mostly internal while the external debt is owed mostly by the private sector.

A more sustained relaxation of the constraint on growth would involve an increase in the domestic savings rate. This opens the question about what is keeping it low at present, in spite of high real interest rates. To search for an answer it is useful to note some characteristics of Brazil.

- At 34 percent of GDP, the country has by far the highest public revenue share in Latin America and one of the highest in the developing world. To achieve this level of taxation, the country is forced into using quite distortionary levies at very high rates, such as a cascading sales tax, a tax on financial transactions and very hefty payroll taxes (over 30 percent).
- In spite of this extraordinary level of taxation, the fiscal balance is precarious. According to the IMF, General Government debt as a share of GDP stood at 95.1 percent in 2002, while the overall deficit was 4.7 percent of GDP in that same year.
- Current spending and transfers represent a very large part of public spending. Pension expenditures stand at 8.5 percent of GDP, which is unusually high given the country's demography. They reflect the country's low retirement age and generous terms for its mostly middle class public and formal sector employees.

To put this in the context of the model presented in the previous section, the country has a very high level of entitlements and/or waste. Given this, the country is forced to choose among a very high tax rate, high public sector prices, low investment in infrastructure and low subsidies for human capital.

All these things are bad for growth. They are also bad for the private return to capital. More human capital and more infrastructure would further increase the returns to fixed capital. But returns are already very high and investment is constrained for lack of loanable funds. If high taxation and the paucity of public goods were in themselves the binding constraint, the private return to investment would be low and equilibrium between savings and investment would be established at a lower return to capital.

In this interpretation, the problem of Brazil is that it has too heavy a burden of transfers and too high an inherited stock of public debt. This means that a very large part of national income gets taxed away, depressing national savings.

What should the focus of policy be in this case? It is clear that if Brazil had Chile's fiscal fundamentals, there would be substantially more investment in the economy. The goal is to improve national savings. One alternative would be to lower government waste,  $\omega$ . This would allow the economy to save more either through an increase in public saving or a reduction in taxation. This may even have a positive effect on the external constraint if it is related to fears of fiscal insolvency. In the absence of this first best policy, the question is whether a pro-growth strategy can be based on an apparently anti-growth set of policy measures such as increases in taxation and public prices and cuts in infrastructure and human capital subsidies. The analysis

above would suggest a positive response. The microeconomic inefficiencies of taxation and sub-optimal spending structures are not binding because reducing them would increase the returns to capital but would not generate the means to exploit those returns.

If the country can get into a more accelerated growth path and if “waste” does not grow with GDP, the economy may outgrow its burdens and be able to gradually improve its tax and spending system as fiscal resources become more abundant. In this respect, the fiscal first strategy followed by the country until now, in spite of the microeconomic inefficiencies it generates, may well be the best way to go.

### **5.5. The Dominican Republic: growth and then crash**

The Caribbean is an unlikely place to find a success story. The region once seemed naturally destined to produce sugar cane, the source of its wealth since the XVII century. With the heavy protection of sugar in Europe and the U.S., the Caribbean lost its obvious export crop. States in the region are too small to embark on import substitution industrialization although some tried with disastrous consequences. The Dominican Republic had been lucky because in addition to sugar it had a gold mine. However, this resource became exhausted in the 1980s. The country had to reinvent itself and it was not obvious how.

The country had quite precarious political and bureaucratic institutions. The difficulties of the 1980s had wrecked havoc with its macro balance. A balance of payments crisis erupted in 1991 and the country dealt with it swiftly and accompanied it with modest structural reforms: a unification of its exchange rate regime and some trade liberalization. This triggered a sustained period of high growth that essentially lasted a decade until it was quickly brought to an end in the 2002 banking crisis. Yet even in a period of extreme financial turmoil in 2002-2004, the economy did not contract, as happened in most other places in the region, namely, Argentina, Colombia, Ecuador Uruguay and Venezuela.

What explains its success and its current problems? Why did the achievement of macro balance and some reform lead to such fast growth in the Dominican Republic and not in other places? Ex-post, the answer seems to be in the importance of three main drivers of growth: tourism, maquila and remittances.

Remittances tripled in the last decade to a level of US\$ 2.1 billion in 2002 or 9.9 percent of GDP. Tourism did even better. It increased from US\$ 0.7 billion in 1991 to US\$ 2.5 billion in 2000 (11.8 percent of GDP). Net maquila exports per capita doubled to a level of about US\$ 200 per capita in 2000-2001, the highest in the Americas including NAFTA member Mexico.

Now, these three engines of growth are dependent on some institutional setup. Tourism requires some level of investor, personal and environmental security. While it would be ideal to assure these three elements for all, all-inclusive, relatively closed resorts can do with a more targeted provision, using private security and infrastructure. So the country created an adequate environment for that industry to take off.

By the same token, maquila is an exception to the general laws that apply to other activities. With a sufficiently effective institutional framework for this sector, it can take off even if the rest of the economy is stranded with ineffective institutions and regulations.

In this sense, the Dominican Republic is a good example of an alternative path to institutional development. Such a path would involve listening to the institutional and public good requirements of sectors that see high potential returns and that can be scaled up significantly to

become important. In other words, the reforms are geared at solving the specific institutional problems that potentially important new sectors face so as to increase their expected rate of return and allow an investment boom to start there.

As these “enclave” sectors grow and generate employment and income, they contribute directly or indirectly to the tax base and to domestic intermediate demand. This is the time to try fixing up the bottlenecks in the rest of the economy. It resembles a game of curling that as the puck slides on the ice, the players work feverishly to polish the ice so that the puck keeps sliding forward. Trade liberalization will make the rest of the economy more like the maquila sector. Personal security and environmental standards can be upgraded in the rest of the country. This will bring benefits to all, including those tourists who might actually venture beyond the grounds of the resort.

Clearly, the problem with this strategy is that the economy might outgrow its relatively weak institutional setting. It is hard to know which institution will crack. It could be that economic success makes foreign lending available to the government without the budget institutions to keep fiscal discipline, as happened in many Latin American countries in the 1970s when they were showered for the first time with syndicated foreign loans. It could be that the stakes of the political game become so high that the political process gets disrupted.

None of this happened in the Dominican Republic. Fiscal balance was maintained and the political process became, if anything, more institutionalized. However, the financial system did grow very fast with the economic expansion and became more integrated to the rest of the world. Imposing prudential regulatory standard on banks became institutionally and politically difficult. Some banks were politically influential and as a group they were capable of blocking legislation and administrative actions by a technically and politically weak regulator. When September 11, 2001 brought a sudden stop to the flow of international tourism, a Ponzi scheme in the banking system was uncovered. Through some mix of limited institutional competence and inadequate political independence, managing this crisis involved converting over 20 percent of GDP in bank losses into the public debt.

As usual, these bank rescues involve drastic expansions of domestic credit by the central bank, which in the Dominican Republic had no international reserves with which to sterilize money creation. The exchange rate quickly depreciated from 17.8 R\$/US\$ in January 2003 to 34.9 R\$/US\$ in July of 2003 and 48.6 by June 2004. This massive depreciation caused an acceleration of inflation to over 65 percent in the year to over 65 percent in the year to June 2004.

These changes wreaked havoc with the fiscal accounts. The new debt issued by the central bank raised the quasi-fiscal deficit by over 2 percent of GDP. The depreciation increased the domestic resource cost of the foreign currency public debt. The public debt tripled from less than 20 percent of GDP to over 50 percent of GDP. In addition, a system of indirect subsidies for liquefied petroleum gas (LPG) and for electricity, which had prices fixed in pesos, became much more expensive to sustain. Unable to take harsher measures in an already difficult situation, the government decided to limit price increases for these goods but this meant a level of subsidy that it was unable to pay. Massive shortages of electricity and gas ensued.

The country is still in the midst of this crisis, although there are some indications it may be pulling itself out. But the moral of the story is clear. Re-igniting growth may not require the infinite laundry list of reforms that have become the current consensus on best practices. But once the economy is on the path of growth, the onus is on policymakers to solve the institutional

and other constraints that will inevitably become more binding.

## 6. Conclusions

Across-the-board reform packages have often failed to get countries growing again. The method for growth diagnostics we provide in this paper should help target reform on the most binding constraints that impede growth.

An important advantage of our framework is that it encompasses all major strategies of development and clarifies the circumstances under which each is likely to be effective. Strategies that focus on resource mobilization through foreign assistance and increased domestic national saving pay off when domestic returns are both high and privately appropriable. Strategies that focus on market liberalization and opening up work best when social returns are high and the most serious obstacle to their private appropriation is government imposed taxes and restrictions. Strategies that emphasize industrial policy are appropriate when private returns are depressed not by the government's errors of commission (what it does), but its errors of omission (what it fails to do).

As our discussion of El Salvador, Brazil, and the Dominican Republic illustrates, each of these circumstances throws out different diagnostic signals. An approach to development that determines the action agenda on the basis of these signals is likely to be considerably more effective than a laundry-list approach with a long list of institutional and governance reforms that may or may not be well targeted on the most binding constraints to growth.



## 7. Appendix

### 7.1. Consumption-savings problem

Defining  $a_t = k_t + b_t$ , 3.1 and 3.3 can be written as

$$\dot{a}_t = \rho a_t + r_t k_t^{1-\theta} \bar{k}_t^\theta - \rho k_t + \pi_t - c_t (1 + \delta) \quad (7.1)$$

$$a_t \geq (1 - \beta) k_t. \quad (7.2)$$

The Hamiltonian is

$$H = \log(c_t) + \chi_t [\rho a_t + r_t k_t^{1-\theta} \bar{k}_t^\theta - \rho k_t + \pi_t - c_t (1 + \delta)] + \mu_t [a_t - (1 - \beta) k_t], \quad (7.3)$$

and FOC are

$$\frac{1}{c_t} = \chi_t (1 + \delta) \quad (7.4)$$

$$\chi_t (r_t (1 - \theta) - \rho) = (1 - \beta) \mu_t \quad (7.5)$$

$$\dot{\chi}_t = -\mu_t, \quad (7.6)$$

plus a transversality condition not shown here.

From complementary slackness we have

$$\mu_t = \begin{cases} \frac{\chi_t (r_t (1 - \theta) - \rho)}{1 - \beta} & \text{if } r_t (1 - \theta) > \rho \\ 0 & \text{otherwise} \end{cases}, \quad (7.7)$$

so  $r_t (1 - \theta) = \rho$  if  $\mu_t = 0$ .

Combining 7.4, 7.5 and 7.6 in the case of  $\mu = 0$  we have 3.7 in the text, while combining 7.4, 7.6 and 7.7 in the case of  $\mu_t > 0$  we have 3.6 in the text.

### 7.2. Firms' problem

Profits are given by

$$(1 - \tau) y_t - r_t (1 - \sigma) x_t - v_t g, \quad (7.8)$$

where  $\tau$  is the constant income tax rate,  $v$  is the cost per unit of public services and  $\sigma$  is the subsidy rate applied to purchases of productive inputs, all three chosen by the government.

FOC are

$$(1 - \tau) \alpha y_t = r_t (1 - \sigma) x_t \quad (7.9)$$

$$(1 - \tau) (1 - \alpha) y_t = v_t g_t \quad (7.10)$$

Using 7.9 and 7.10 in 7.8 we have  $\pi_t = 0$ . Since all factors are paid their marginal products and we have constant returns to scale, factor payments exhaust firm net revenue. Last, using 3.8 and 7.10 in 7.9 yields 3.9 in the text.

### 7.3. Balanced growth path

Using the facts that profits are zero and that in equilibrium  $\bar{k}_t = k_t$ , 3.1 becomes

$$\dot{k}_t + \dot{b}_t = rk_t + \rho b_t - c_t(1 + \delta), \quad (7.11a)$$

If the economy is constrained, then  $-b_t = \beta k_t$  and therefore 7.11a becomes.

$$\frac{\dot{k}_t}{k_t} = \frac{r - \rho\beta}{1 - \beta} - \frac{c_t(1 + \delta)}{(1 - \beta)k_t}. \quad (7.12)$$

Now, for a BGP we must have constant  $\frac{c_t}{k_t}$ . This implies  $\frac{\dot{k}_t}{k_t} = \frac{\dot{c}_t}{c_t}$ . Combining 3.6 and 7.12 we have

$$\frac{c_t}{k_t} = \frac{r\theta + \rho(1 - \beta)}{1 + \delta}, \quad (7.13)$$

which appears in the text at 3.12. At the beginning of time this last expression specializes to

$$\frac{c_0}{k_{0+}} = \frac{r\theta + \rho(1 - \beta)}{1 + \delta}, \quad (7.14)$$

where  $k_{0+}$  is the stock of capital which the household holds at the end of period 0.

What is this stock? It need not be the stock the household inherited, since it can borrow abroad and increase its holdings of capital at the beginning of time. Recall  $k_0$  is the initial inherited stocks. When markets open, if the borrowing constraint is binding it must be the case that

$$-b_{0+} = k_{0+} - k_0 = \beta k_{0+}, \quad (7.15)$$

or

$$k_{0+} = \frac{k_0}{1 - \beta} \quad (7.16)$$

Combining this with 7.14 we obtain

$$\frac{c_0}{k_0} = \frac{r\theta + \rho(1 - \beta)}{(1 + \delta)(1 - \beta)}. \quad (7.17)$$

If the economy is not constrained  $k_t = 0$  for all  $t \geq 0$ , so 7.1 becomes

$$\frac{\dot{a}_t}{a_t} = \rho - \frac{c_t(1 + \delta)}{a_t} \quad (7.18)$$

We know from 3.7 in the text that in the unconstrained case consumption grows at the rate 0. For a BGP we now need  $\frac{\dot{a}_t}{a_t} = \frac{\dot{c}_t}{c_t}$ . Combining 3.7 and 7.18 yields

$$c_t = \left( \frac{\rho}{1 + \delta} \right) a_t \left( \frac{\rho}{1 + \delta} \right) k_t, \quad (7.19)$$

which specializes at time zero to

$$c_0 = \left( \frac{\rho}{1 + \delta} \right) a_0 = \left( \frac{\rho}{1 + \delta} \right) k_0 \quad (7.20)$$

So when unconstrained the household also consumes a fixed portion of inherited assets. Equations 7.19 and 7.20 are summarized in the text as 3.13.

#### 7.4. Welfare

Let  $\gamma_i$ ,  $i = C, U$ , be the speed at which consumption (and the economy) grow along a BGP. We know that if constrained, the economy grows at  $\gamma_C = \frac{r(1-\theta)-\rho}{1-\beta}$ , while if unconstrained the economy grows at  $\gamma_U = 0$ . Using this definition, welfare along the BGP can be written as

$$W = \int_0^\infty \log c_t e^{-\rho t} dt = \int_0^\infty \log c_0 e^{-\rho t} + \gamma_i \int_0^\infty t e^{-\rho t} dt = \frac{\log c_0}{\rho} + \frac{\gamma_i}{\rho^2} \quad (7.21)$$

Next, using expression 7.17 above, in the constrained case welfare becomes 3.14 in the text.. Using 3.13, welfare in the unconstrained case becomes 3.15 in the text.

#### 7.5. Controls on capital inflows

If  $r(1-\theta) < \rho$  and capital cannot leave the country, there will be no capital inflows or outflows. Facing a private return  $r(1-\theta)$  on domestic investment, consumption growth will be given by

$$\frac{\dot{c}_t}{c_t} = r(1-\theta) - \rho. \quad (7.22)$$

Capital accumulation will be given by an amended version of 7.11a with  $\delta = 0$  and  $b_t = 0$  for all  $t$ :

$$\dot{k}_t = rk_t - c_t, \quad (7.23a)$$

Combining these two equations yields the consumption function

$$\frac{c_t}{k_t} = \theta r + \rho, \quad t \geq 0. \quad (7.24)$$

It follows that welfare is given by 3.16 in the text.

#### 7.6. Subsidizing productive inputs

Start by rewriting budget constraint 3.11 in the following way. Using 3.8 in the text and first order conditions 7.9 and 7.10, expression 3.11 becomes

$$(1-\omega) \left( \frac{\tau}{1-\tau} \right) + \alpha(1-\omega) \left( \frac{\delta}{1+\delta} \right) \frac{r\theta + \rho(1-\beta)}{r(1-\sigma)} = (1-\alpha) \left( \frac{1-v}{v} \right) + \alpha \left( \frac{\sigma}{1-\sigma} \right) \quad (7.25)$$

If  $\tau = 0$  and  $v = 1$ , this government budget constraint is

$$(1-\omega) \left( \frac{\delta}{1+\delta} \right) \frac{r\theta + \rho(1-\beta)}{r(1-\sigma)} = \left( \frac{\sigma}{1-\sigma} \right) \quad (7.26)$$

Using this expression, welfare function 3.14 in the text can be written

$$W_C = \frac{\log(r - r(1-\sigma)) - \log(1-\omega) - \log(\delta) - \log(1-\beta) + \log k_0}{\rho} + \frac{r(1-\theta) - \rho}{\rho^2(1-\beta)}, \quad (7.27)$$

The Lagrangean of our problem is

$$L = W_C + \lambda_B \left[ (1-\omega) \left( \frac{\delta}{1+\delta} \right) \frac{r\theta + \rho(1-\beta)}{r(1-\sigma)} - \left( \frac{\sigma}{1-\sigma} \right) \right] \quad (7.28)$$

Maximizing with respect to the subsidy and rearranging yields

$$\frac{\partial L}{\partial \sigma} = \left( \frac{1}{1-\sigma} \right) \left[ \frac{1}{\rho\sigma} + \frac{r(1-\theta)}{\rho^2(1-\beta)} + \left( \frac{\lambda_B}{1-\sigma} \right) \left[ (1-\omega) \left( \frac{\delta}{1+\delta} \right) \theta - 1 \right] \right] \quad (7.29)$$

Next, maximizing with respect to the consumption tax rate and maximizing we have

$$\lambda_B = \frac{1+\delta}{\rho} \left( \frac{1-\sigma}{\sigma} \right) \quad (7.30)$$

Combining these two expressions to eliminate  $\lambda$  and rearranging yields

$$\frac{\partial L}{\partial \sigma} = \left( \frac{1}{1-\sigma} \right)^2 \frac{1}{\rho} \left[ \frac{\alpha(1-\alpha)^{\frac{1-\alpha}{\alpha}}(1-\theta)}{\rho(1-\beta)} - \delta \left( \frac{1-\sigma}{\sigma} \right) [1-\theta(1-\omega)] \right], \quad (7.31)$$

where we have used the fact that in this case  $r(1-\sigma) = \alpha(1-\alpha)^{\frac{1-\alpha}{\alpha}}$ . So whether the effect on welfare of raising subsidies is positive or negative depends on  $\sigma$  and  $\delta$  themselves.

If  $\omega = 0$ , it is straightforward to show that  $\frac{\partial L}{\partial \sigma} = 0$  implies  $\sigma = \theta$ . That is, the optimal subsidy is one that fully offsets the externality. But if  $\omega > 0$ , the optimal subsidy is smaller than  $\theta$ .

### 7.7. Raising the cost of public services

The Lagrangean of this problem is

$$L = W_C + \lambda_B \left[ (1-\omega) \left( \frac{\tau}{1-\tau} \right) - (1-\alpha) \left( \frac{1-v}{v} \right) - \alpha \left( \frac{\sigma}{1-\sigma} \right) \right] \quad (7.32)$$

where notice that we have set  $\delta = 0$ . The effect on welfare of changing  $v$  is

$$\frac{\partial L}{\partial v} = - \left( \frac{1-\alpha}{v} \right) \left[ \kappa r - \lambda_B \left( \frac{1}{v} \right) \right] \quad (7.33)$$

where  $\kappa = \delta^{-2}(1-\beta)^{-1}\alpha^{-1}$ .

The best tax level is given by

$$\frac{\partial L}{\partial \tau} = - \frac{\kappa r}{1-\tau} + \lambda_B \frac{1-\omega}{(1-\tau)^2} = 0 \quad (7.34)$$

or

$$\lambda_B = \kappa r \left( \frac{1-\tau}{1-\omega} \right). \quad (7.35)$$

Substitution into 7.33 to eliminate  $\lambda_B$  yields

$$\frac{\partial L}{\partial v} = \left( \frac{1-\alpha}{v} \right) \kappa \left[ \frac{(1-\tau) - (1-\omega)v}{(1-\omega)v} \right] \quad (7.36)$$

Expression 7.36 implies the welfare-maximizing policy is given by

$$v = \frac{1 - \tau}{1 - \omega}, \quad (7.37)$$

so that it is only optimal to charge fully for public services if  $\omega \geq \tau$ .

To gain more insight, consider a special subcase. Suppose that  $\omega = 0$ , so that  $v = 1 - \tau$ . In that case the government budget constraint is

$$\frac{1 - v}{v} = \frac{\sigma}{1 - \sigma}, \quad (7.38)$$

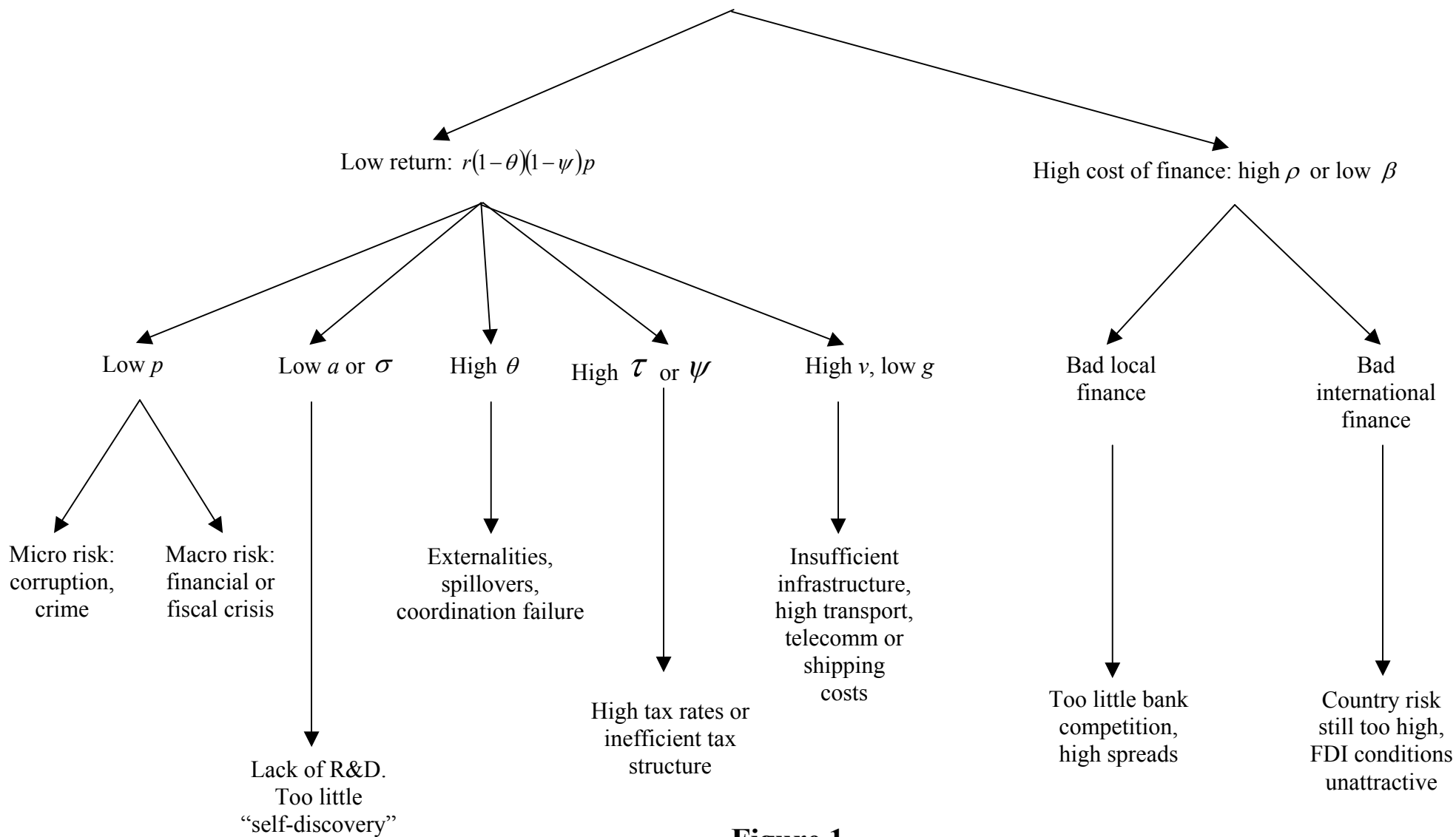
or  $v = 1 - \sigma$ . That is, the price of public services should be kept below their production cost of one only if there are other activities to finance—in this case subsidies. If  $\sigma = 0$ , then  $v = 1$ .

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# PROBLEM: LOW GROWTH

Growth condition depends on comparison of private returns and costs:  $\frac{r(1-\theta)(1-\psi)p-\rho}{1-\beta}$ , where  $r = [\alpha^\alpha (1-\alpha)^{1-\alpha} a(1-\tau)v^{-(1-\alpha)}]^{1/\alpha} (1-\sigma)^{-1}$



**Figure 1**

Table 1: GDP growth rates

Country	Average GDP (% real change pa)			
	1998-2003	1993-2003	1990-2000	1980-2000
BRA	1.4	2.7	2.7	2.7
DOM	4.8	5.1	4.8	4.3
SLV	2.6	3.7	4.6	1.5
OECD(AGG.)	2.3	2.4	2.7	2.9
UNITED STATES	3.0	3.2	3.2	3.3

Source: Economist Intelligence Unit

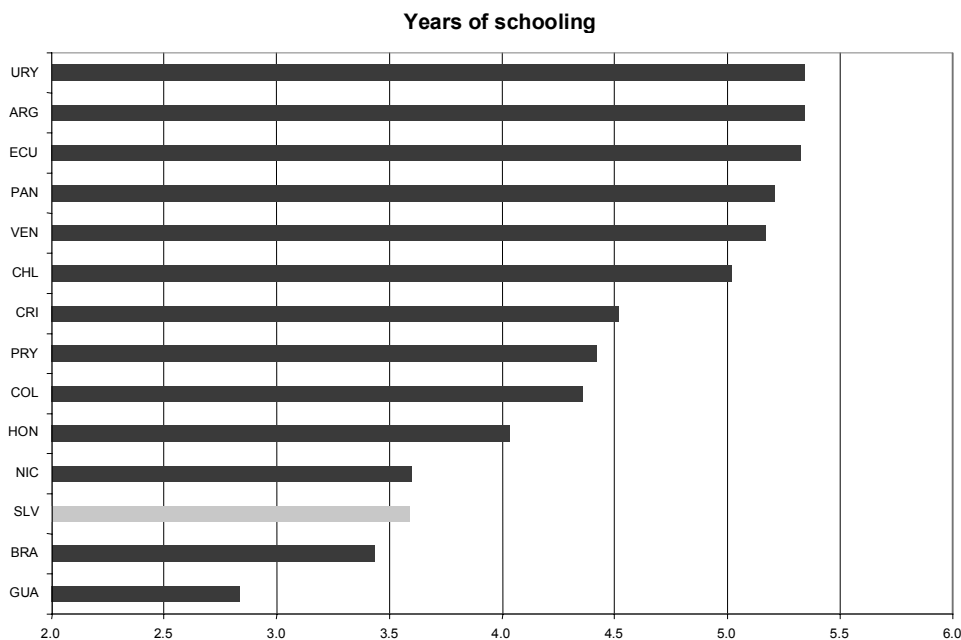
Table 2: Savings, investment and the current account  
(as percent of GDP, average 1990-2000)

Country	Gross national savings	Gross fixed capital formation	Current account balance
BRA	18.7	20.8	-2.2
DOM	18.9	22.2	-3.2
SLV	15.6	17.4	-1.8

Source: World Penn Tables.

Note: remittances are counted as part of national income

Figure 2. Average years of schooling of 12-year-old children (circa 1998)



Source: IDB



Figure 3.

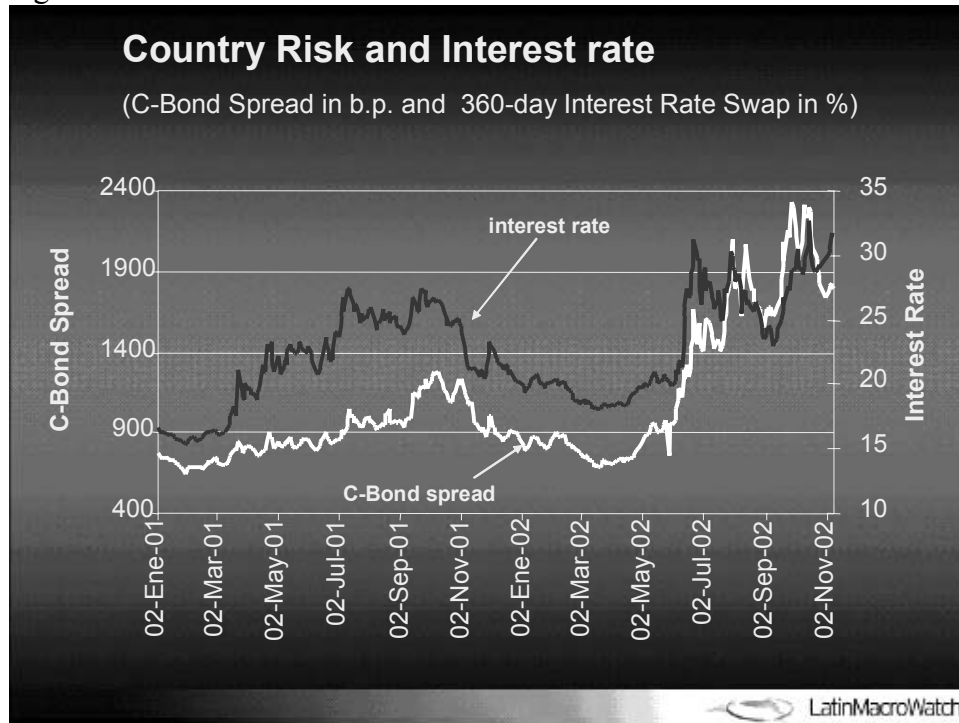
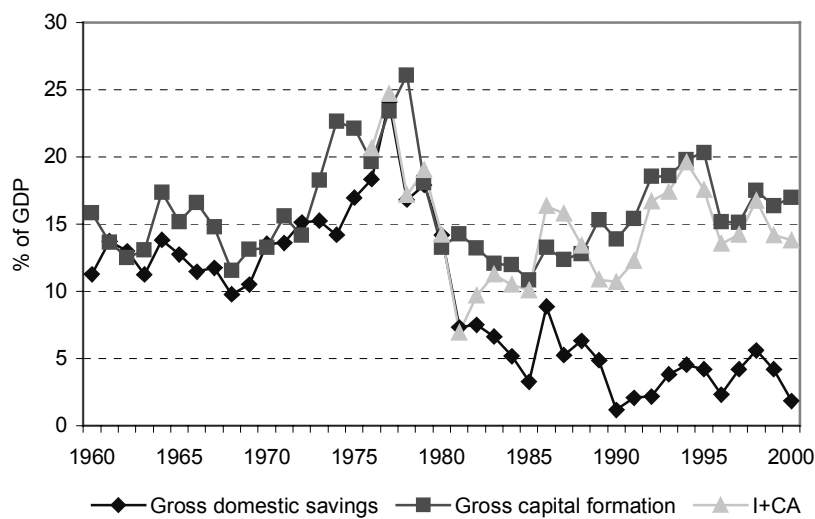


Figure 4 Domestic savings, national savings (including remittances) and investment (as % of GDP)



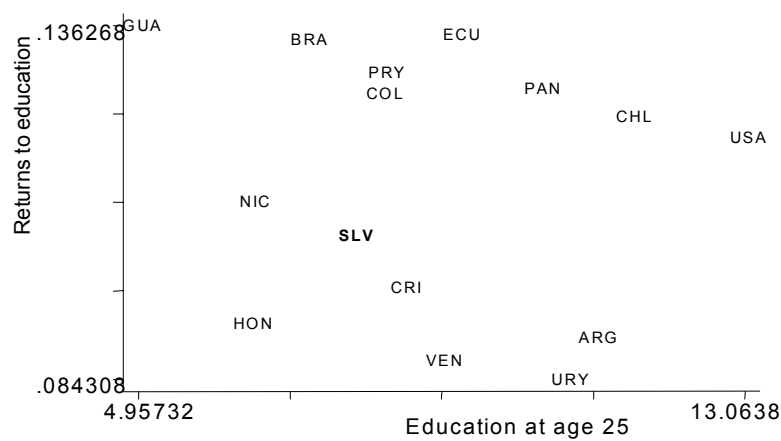
**Table 3. Returns to schooling**

country	year	Returns to 1 more year of schooling	Return to finishing primary	Return to finishing secondary	Return to finishing higher education
ARG	1998	0.091	0.422	0.789	1.127
BOL	1999	0.113	0.781	1.283	1.425
BRA	1999	0.132	0.622	1.138	1.922
CHL	1998	0.123	0.341	0.761	1.458
COL	1999	0.119	0.449	0.908	1.668
CRI	1998	0.098	0.326	0.684	1.220
DOM	1996	0.068	0.281	0.377	0.896
ECU	1998	0.135	0.681	1.310	1.833
GUA	1998	0.136	0.841	1.347	1.991
HON	1999	0.104	0.467	1.003	1.506
MEX	1996	0.126	0.709	1.225	1.732
NIC	1998	0.110	0.574	0.860	1.636
PAN	1999	0.116	0.483	1.015	1.559
PER	1997	0.129	0.474	0.990	1.459
PRY	1998	0.129	0.665	1.181	1.662
<b>SLV</b>	<b>1998</b>	<b>0.105</b>	<b>0.557</b>	<b>1.027</b>	<b>1.482</b>
URY	1998	0.084	0.427	0.765	1.079
VEN	1999	0.085	0.351	0.622	1.076
TAI	1996	0.067	0.257	0.500	0.826
THA	1998	0.192	0.915	1.827	2.361
USA	1998	0.120	0.186	0.553	0.980
	max	0.192	0.915	1.827	2.361
	min	0.067	0.186	0.377	0.826
	average	0.114	0.520	0.970	1.493

Source: Calculations based on surveys collected by the Inter-American Development Bank

Note: The first column is the returns to years of schooling, after controlling for age and age squared. Columns 2 two 4 are the returns from completing primary, secondary and higher education, after controlling for age and age squared.

Figure 5. Returns to education and years of schooling



Source: Calculations based on surveys collected by the Inter-American Development Bank

Figure 6

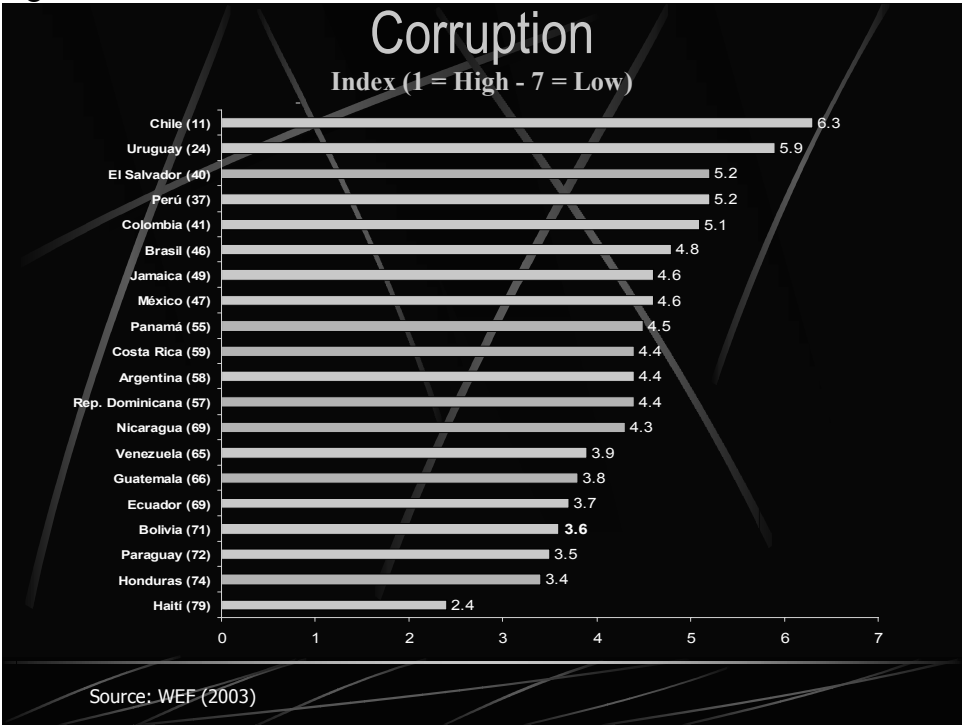


Figure 7

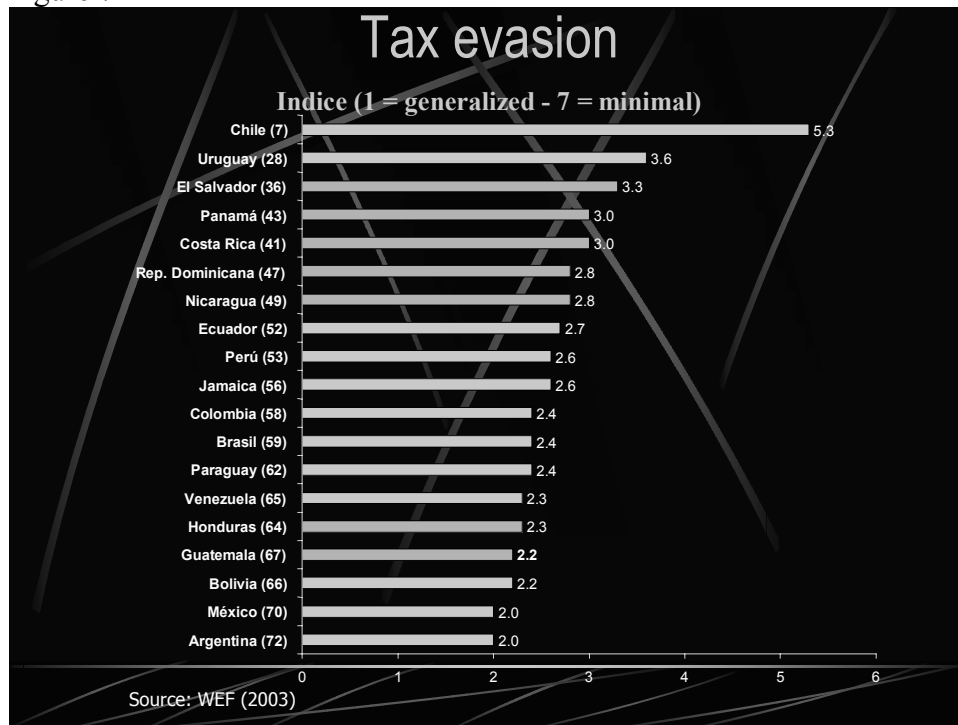


Figure 8. Real exchange Rate, Remittances and the Trade Balance

